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OF THE

Field Naturalists' Club of Victoria

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Hon. Editor: **CHARLES BARRETT**

The Author of each Article is responsible for the facts and
opinions recorded

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ERRATA

- Page 47—For "*Anigozanthus*" read "*Anigozanthos*."
 Page 50—For "*squairoso*" read "*squarrosa*."
 Page 52—For "*sambricifolius*" read "*sambucifolius*."
 Page 118—For "*Aspidium*" read "*Dryopteris*."
 Page 147—For "*rosemarinifolius*" read "*rosmarifolius*," and on pp. 174, 189.
 Page 147—For "*Pultenea*" read "*Pultenaea*"; "*ilicifolia*" read "*ilicifolia*."
 Page 165—For "*Patersoni*" read "*Patersonii*."
 Page 189—For "*Waltheri*" read "*Walteri*"; "*Suttoni*" read "*Suttonii*."
 Page 190—For "*Pimelia*" read "*Pimelea*."
 Page 192—For "*nivea*" read "*cuneata*."
 Page 195—For "*suaevolens*" read "*suaveolens*"; "*linarifolia*" read "*monogyna*."
 Page 236—For "*ramosissima*" read "*ramosissima*."
 Page 299—For "*Kangaroo Fern*" read "*Scented Polypody*."
 Page 348—For "*Asmunda*" read "*Osmunda*."

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The Victorian Naturalist

VOL. XLIV—No. 1.

MAY 7, 1927.

No. 521.

FIELD NATURALISTS' CLUB OF VICTORIA.

A special meeting of the Club was held in the Royal Society's Hall, Victoria-street, on Monday, April 11th, 1927. The President, Mr. E. E. Pescott, F.L.S., occupied the chair, and about 70 members and visitors were present.

The President stated that the meeting had been called for the purpose of considering the proposed alterations of the rules. In accordance with notice of motion given at the previous ordinary meeting, the proposed alterations and additions, as recommended by the Committee, were submitted *seriatim*, and, on the motion of Mr. G. Coghill, seconded by Mr. F. Pitcher, were accepted and passed unanimously.

Mr. A. J. Tadgell moved, in accordance with notice of motion given at the previous ordinary meeting, that the following addition be made to Rule 4, clause (b):—"Provided also that the Secretary and/or Treasurer shall, while he continues in office, be exempt from payment of member's subscription, but shall, *ipso facto*, be deemed a financial member of the Club." This was seconded by Mr. E. R. Hammett. After discussion, in which Messrs. F. Chapman, G. Coghill, F. Pitcher, and C. Lambert took part, the motion was put to the meeting, but was not carried.

Mr. Tadgell gave notice of motion for the alteration of Rule 7 to read:—"The first year's subscription of any newly-elected member shall be paid in full on his or her election as a member of the Club."

The Special Meeting then closed, and the ordinary meeting was held.

ORDINARY MEETING.

CORRESPONDENCE.

From Miss F. Smith, thanking the Club for expressions of sympathy in her recent bereavement.

From Mr. E. S. Hanks, thanking members for sympathy expressed in connection with his recent accident.

From Department of Lands and Survey, advising that it had been decided to reserve 3,586 acres, as a Public Park, at Sperm Whale Head, in the Parish of Boole Poole. It was resolved that a letter of thanks and appreciation be sent to the Minister of Lands in connection with this reservation.

From Under-Secretary for Victoria, stating that the absolute prohibition of the sale and use of the pea-rifle was not deemed advisable, but that special instructions had been issued to the Police Force to ensure that the provisions of the Act restricting the use of this weapon to persons over 18 years of age, be enforced.

REPORTS.

Reports of excursions were given as follow:—Clematis Gully, Belgrave, Mr. F. Pitcher; Mentone to Black Rock, Mr. L. L. Hodgson.

ELECTION OF MEMBERS.

The following were elected as ordinary members.—Miss R. Rigg and Mr. G. Rigg, 20 Finch-street, East Malvern; Mr. and Mrs. W. H. McCartney, 42 Adelaide-street, Malvern; Mr. N. H. Seward, 457 Bourke-street, Melbourne; Mr. J. C. Porter, Centre Road, Bentleigh; and Professor A. J. Ewart, D.Sc., F.R.S., F.L.S., University, Carlton.

LECTURE.

The President introduced Mr. F. Lewis, Chief Inspector of the Fisheries and Game Department, who delivered a lecture dealing with fish hatcheries and methods of fish distribution in various countries; and more particularly in Victoria. Mr. Lewis described the new method of brine-freezing fish, and referred to the valuable work done by Dr. Schmidt in elucidating the mystery of the breeding habits of eels. A series of lantern slides depicting various phases of operations in connection with Victorian fish hatcheries was shown. A vote of thanks to Mr. Lewis, moved by Mr. C. Daley, B.A., F.L.S., and seconded by Mr. F. G. A. Barnard, was carried with acclamation.

The President took the opportunity of thanking Mr. Lewis for the sympathetic way in which he had received various representations from the Club, particularly in regard to the protection of the Kookaburra, and the promptitude with which he had acted on suggestions placed before him by the Club.

EXHIBITS.

By Mr. A. L. Scott (in illustration of points discussed at the excursion to Beaumaris): Jaw of shark caught in South Seas, showing the successive rows of teeth. Under microscopes: teeth of various molluscs. Series of specimens illustrating various aspects of fossilisation.

By Mr. F. Pitcher: Mounted specimens of 22 species of ferns, collected at Clematis Gully (Belgrave). Bifur-

cated frond of *Alsophila excelsa*, growing in exhibitor's garden at South Yarra.

By P. R. H. St. John: Herbarium specimens of *Dryopteris decomposita* (R. Brown), Ktze, "Shiny Shield Fern" (with creeping rhizome); Eastern Australia, Tasmania, New Zealand. **Dryopteris glabella* (C. Christensen), "Smooth Shield Fern" (with tufted rhizome); Eastern Australia, New Zealand. Collected by exhibitor at Clematis Gully, Kallista, March 19, 1927. These two ferns have hitherto been mistaken for the one species, *Dryopteris decomposita*.

By Miss Amy Fuller: Dried specimens of *Fieldia australis*, A. Cunn., Blue Mountains, N.S.W. *Trachymene ericoides*, Sieber, and *Humea oxothamnoides*, F.v.M., Mount Victoria, N.S.W. *Sterculia quadrifida*, R. Brown, N.S.W.

²New record for Victoria.

SPECIATION AND MUTATION.

In the final paper of a brilliant series on the Origin of Species, Professor Henry Fairfield Osborne deals with Speciation and Mutation. From his summary of the conclusions drawn from the independent observations of many kinds of living vertebrates, the following is quoted:—

"It appears that the problem of the age-long process of the origin of species can best be studied under the natural conditions of past and present time; it appears that all vertebrates which range into a new set of natural conditions, whether by geographic isolation or otherwise, in the course of time give rise to new specific forms; it appears that, where vertebrates can be traced from one geographic range as it merges into another, 'transitional' or 'intermediate' forms are observed, so that if placed side by side one sub-species passes gradually into another by *intergrades*, and thus supposed barriers existing between species and sub-species disappear."—(*American Naturalist*, Vol. LXI, Jan.-Feb., 1927.)

Speciation is a word, perhaps unfamiliar to many Australian field naturalists, which is being widely used in America, though admittedly "etymologically doubtful." It is certainly ugly, but the use of it is approved by some noted English zoologists, and it is likely to gain general favour, as a word required, despite the dissent of zoological classicists. *Speciation* means, of course, "the making of species," and is a normal and continuous process, which governs the greater part of the origin of species (Osborne).

A generous gift from Mr. A. E. Keep has added to the Club's Library, two important botanical works, recently published, namely, "The Ferns," Vol. II., by Professor F. O. Bower, and "The Classification of Flowering Plants," Vol. II. (Dicotyledons), by Dr. A. B. Rendle.

CRANE-FLIES OR DADDY LONG-LEGS.

BY CHARLES P. ALEXANDER, PH.D., F.E.S.

The long-legged, delicate flies that are commonly called crane-flies, in allusion to their very long, crane-like legs, are known to everyone who has observed the insect life of the shaded gullies or along the mountain streams.

It is most unfortunate that these long, slender legs are so delicately attached that they are lost upon the slightest mishandling. It is probable that it was this fragile nature of the legs, and the consequent unsightliness of the specimens, that caused crane-flies to be one of the most neglected of all abundant and widespread groups of insects. This neglect is especially unfortunate, because the family of crane-flies, or, as termed by the scientist, the family *Tipulidae* (after the first-named and largest genus, *Tipula* Linnæus) comes almost at the beginning of the great order Diptera. The flies of this family are thus vastly ancient, the earliest known types having appeared in all probability some 100,000,000 years ago. During this period of the descent of the crane-flies, the Dinosaurs and other gigantic reptiles have waned and disappeared, while the entire class of mammals has been evolved. In the Eocene, some 45,000,000 years ago, crane-flies were already notably developed as a group, and were widely distributed over the world. At this period, the Dawn Horse, the tiny *Eohippus*, the oldest known of the distinguished line of horses, was living in what is now western Northern America.

Having had such a vast period of time in which to evolve and spread, there is no cause for astonishment when we ascertain the facts in the crane-flies present-day distribution. For members of this group of delicate flies have been found in virtually every part of the world where insect life can exist. Species occur above the 80th degree of north latitude, in Greenland, within a few hundred miles of the North Pole. Others have invaded the lands furthest to the south (excepting the Antarctic continent, which, to the writer's knowledge, has produced no winged insects), including the storm-swept Straits of Magellan and Cape Horn, the Falklands, and even the Macquarie Islands and others in the South. The most remote oceanic islands have their quota of crane-flies, often reduced in number of species, and, strange to say, it is not the large, vigorous forms which occur, but the delicate, ethereal species.

In the mountains, crane-flies have been found above 10,000 feet, in most regions of the world where the land attains this altitude. In the mountains of Mexico, species have been taken above 13,000 feet. In the vast intermediate and more optimum regions, members of the group, totalling an unknown number of thousands of kinds, occur in a variety of haunts that includes almost every possible ecological habitat, with the exception of the very dry. Crane-flies are notable lovers of moisture, and the greatest number of species in any given region are to be found in the vicinity of streams or mountain brooks, in wet meadows or margins of bogs, or in the cool shade of damp woodlands, where the larvae, or developmental stages, are spent in the damp moss, in thick leaf-mold, or in the wet, decaying wood of prostrate trunks of trees.

Victoria is wonderfully blessed with some of the most magnificent species of crane-flies that have yet been discovered. The great orange-and-black species of *Clytocosmus*, the splendid black and silver-spangled *Platyphasia regina* Skuse, and additional species of the equally imposing genus *Plusio-myia*, occur in the gullies of the Dandenong Range, and near Warburton, where they were first discovered by the late Mr. F. P. Spry, Mr. F. E. Wilson, my friend, Mr. J. Searle, and other collectors. Besides these large and magnificently colored species, these same gullies, and at least the lower ranges of the Victorian Alps, support a wealth of other large, but more obscurely-colored crane-flies, as well as a host of the very small to medium-sized, usually hairy, gnat-like kinds that have been much neglected and are apt to add very greatly to our knowledge of certain problems of distribution. The affinities of the Victorian fauna, as shown by the material so far available, are with Tasmania rather than with the Blue Mountain region of New South Wales. Many of the species that have been taken in the Dandenong Range likewise occur in Tasmania. It is unfortunate that the crane-flies of the higher altitudes of the Victorian Alps and of Kosciusco, are still very poorly known. Almost any specimens from the mountains of Victoria would add to our knowledge of either seasonal or geographical distribution.

Most crane-flies are fully-winged in both sexes, but in all regions of the world, subapterous forms have been found. In most cases these occur only in the mountains or on the outlying wind-swept islands, or else in the cold

of a northern winter, as in the case of the Snow Fly, *Chionea*, spp. In other cases, however, subapterism occurs under more normal conditions and such instances are difficult of explanation. In one case, the New Zealand genus *Alexandrella* Tonnoir, not only have the wings been lost, but also the halteres. In most crane-flies with reduced wings, it is the female sex only that is so deformed, the males having the wings normally developed. In Victoria, there is a common species of *Macromastix* (*fergusoni* Alex.), taken at Cockatoo by Mr. Hill, near Warburton by Mr. Searle, and elsewhere, that has fully-winged and very active males, the females being much smaller and nearly wingless.

For more than a dozen years the writer has been engaged in securing materials for a comprehensive review of the crane-flies of Australia and Tasmania. Unfortunately this has proved a matter of the greatest difficulty, since only a relatively few collectors seem willing to save these delicate creatures when they find them in their nets. I am writing this small paper to see if some of the younger students of entomology cannot be interested to save these flies, especially when it is realised that they are very common in nature, are not difficult to collect, are easily handled for shipment, and that their study is of the greatest importance in determining many disputed points of phylogeny and distribution.

METHODS OF COLLECTING.

These insects may be told from all other similar and related flies by the long, and usually very long, easily broken legs. It should be emphasised, that no specimens should be discarded, no matter how broken or legless they may be, because the characters most needed for final identification lie in the wings and structure of the male genitalia. As stated above, crane-flies may be swept with a light net from the ferns and other rank herbage growing near streams, on the wet, dripping walls of cliffs, or elsewhere where there is a certain amount of moisture. Many species may be captured while resting, with all six legs (when this full number is present!) outspread, on the walls of houses or trunks of trees, near lakes and streams.

Many crane-flies are strongly attracted to lights, and make their way into houses in the evening, when they may be found the next day, resting on walls or on the windows. This habit may be further used by running a

trap-lantern, as is done in the case of collecting for moths. Unfortunately, the majority of crane-flies thus attracted to light are females, which sex is almost valueless for accurate determination. Such collections should be supplemented by a vigorous sweeping or beating of the vegetation nearby when the missing males will be very apt to be taken. When crane-flies are found swarming, the net may be passed through such a swarm and a rich haul results, since such individuals are apt to be all males, or virtually so.

A day's collecting in the mountains of Victoria, at the height of the season (November to January), might yield a surprising range of these flies. The largest would have a wing-spread up to nearly three inches, the smallest—hairy, midge-like pygmies—would be less than half the size of an ordinary mosquito. The *average* size of the species would probably be equal to or only a little larger than an ordinary gnat or mosquito. It is the small and dull-colored types that are apt to prove of the greatest value.

Crane-flies in the temperate regions of the world have a remarkable seasonal distribution that has been but little studied for the Australian species. The breaking up of the winter in Victoria would produce the early spring forms in September or October. These have a short flight-period and disappear, being followed by others of the late spring and summer, which, in their turn, disappear, being succeeded by the late summer or autumnal types in March and April. It is probable that most of the Victorian species will have the above limited seasonal range, but some species will fly for a much longer part of the season, while others will be found to be double-brooded, the first generation appearing in the spring, the second late in the season. It should be emphasised that there are many, and often very many, of these small and medium-sized types that look very much alike, and even with a hand-lens might be pronounced identical, but which, upon a critical examination prove to be entirely distinct species. It is for this reason that all material found in the net should be taken, and the final settling of identities be done in the laboratory, with a microscope and other necessary accessories at hand.

CARE OF MATERIAL.

It is not a difficult matter to care for the specimens so taken. When on collecting trips, a special bottle or

bottles should be reserved for these flies; or, at least, they should not be placed in the same bottles with moths or butterflies, or with heavy-bodied beetles and similar bulky insects. When thus collected, the specimens are usually found to be in good condition, with but few, if any, of the legs detached in the bottle. The specimens are best shipped by placing in small paper triangles or envelopes, as is commonly done with the Lepidoptera (Waterhouse and Lyell, *Butterflies of Australia*, 1914, p. 228; Tillyard, *Insects of Australia and New Zealand*, 1926, p. 486). A number of specimens of about the same size, and from the same place and date, may be placed in a single triangle. The data, *place, date and altitude*, together with the collector's name or initials, should be placed on the envelopes. The *altitude* is of primary importance in mountain collecting, and should be ascertained as accurately as possible.

When a sufficient number of these triangles has been gathered to warrant a shipment they may be sent in a small strong wooden or tin box, with a layer or cotton on top and bottom to prevent shaking. A little powdered naphthalene sifted into the box will repel book-lice and other destructive vermin. Boxes up to 18 ounces weight may be sent by Sample Post rate (*inscribe packages, "Dry insect specimens for study purposes only; sample post rate"*), the charge being only 1d. for four ounces weight. When received by the special student, the flies are relaxed and mounted. If newly killed specimens are placed in a box reserved for the purpose, they travel through the mails in much better condition than do pinned and spread material.

The writer would greatly appreciate any co-operation in this matter, especially among the younger and more active entomologists, and would be very pleased to collect and exchange insects from North America. If any doubt exists in the minds of the student as to exactly what is a crane-fly, a careful reading of Dr. Tillyard's recent work (*The Insects of Australia and New Zealand*, 1926, pp. 346-349) will clear up the doubtful points. In concluding this brief account, the writer would express his great appreciation of this most remarkable work of Dr. Tillyard. Australasia is to be congratulated upon now having such a comprehensive treatment of the various insect groups. It is very certain that no finer or more scholarly account of the insects of any region of the world has ever appeared.

The Orchids of Victoria

BY EDWARD E. PEScott, F.L.S., F.R.H.S.

PART IX.

12. *P. ALPINA*, Rogers (alpine). "Alpine Greenhood."

Plant slender, usually tall, from 6 to 24 inches. No basal leaves; several leaves and bracts on stem, larger ones 3 or 4 inches long. Flower solitary, *very erect*, shining, pale green, galea upright and then curved forward, blunt; lower lip with wide sinus, bent forward in a swollen manner, then somewhat abruptly incurved, embracing the galea, the lobes somewhat exceeding it. Labellum, linear, lanceolate, movable, much curved forward at end, blunt, appendage quite pectinate. Column shorter, upper lobes toothed, lobes usually wide, lower lobes narrowed, ciliated.

The Alpine Greenhood usually grows in hilly or mountain areas, and especially favours moist places. Its soft green, almost succulent appearance gives it a daintiness much admired. The flower frequently has white or whitish markings. It flowers from September to November, later in high mountain areas. Recorded from all parts except the N.W., and also from Tasmania.

13. *P. FURCATA*, Lindl. (forked, referring to the points of the sepals). "Forked Greenhood."

Plant slender and glabrous, 6 to 12 inches high. Leaves broad, on long petioles, not radical. Flower solitary, rather large, green with brown markings. Galea upright, then curving forward, and somewhat upwards; lower lip with medium sinus, the long linear points embracing and far passing the galea. Labellum movable, oblong linear, blunt, curved outwards, *having a central ridge, channelled on each side*. Basal appendage very pectinate. Upper wings with a short round point, lower wings blunt and ciliate.

This is one of our very rare orchids, having been collected only a few times. The recorded localities are Buninyong, the Dandenong Ranges and the Western district. Flowers late, November to January; recorded also from South Australia and Tasmania.

14. *P. GRANDIFLORA*, R.Br. (large-flowered). "Long-tongue Greenhood."

Plant tall, slender, 6 to 18 inches high; leaves in a basal rosette, 3 to 5, with several clasping stem bracts, becoming larger as they near the flower. Flower large, solitary, rarely 2 or 3; galea much decurved, the central lobe extending to a long filiform point. The *conjoined petals quite widely wing-like*, markedly veined, and usually of a rich red-brown colour. Lower lip with wide sinus, having very long filiform points, embracing and far exceeding the galea, points upright. Labellum linear, long, somewhat contracted towards tip, and then pointed; wings of labellum moderately broad.

This is one of our largest, and most distinctive of Greenhoods. It is quite rare, and until a few years ago, was quite lost for over twenty years. It never appears in colonies, and reproduces slowly. It is found in mountain and hill gullies, usually growing in shaded spots. The wide, beautifully brown and veined petals are its distinctive features. It is recorded only from the South, and also from New South Wales and Queensland. Flowers in winter and early spring.

15. *P. REFLEXA*, R.Br. (bent back). "Striped Greenhood."

Plant slender, about 6 to 8 inches high. Leaves all stem clasping, lanceolate. Flower green, striped with white, solitary, large. Galea upright, with a round short fine point, somewhat recurved. Lower lip erect, sinus wide, having long filiform points, embracing and far exceeding the galea. Labellum lanceolate, tapering to a sharp point, exceeding the column. Basal appendage curved, pectinate. Upper wings of column acute, lower wings blunt and ciliate.

Recent investigations have shown that this species doubtfully exists in Victoria. The plant that we have long classed as *P. reflexa*, does not altogether conform to Brown's type. Dr. Rogers is at present investigating the problem. He states, "There was a time when I thought that it (*P. reflexa*) did" (exist in Victoria) "although for a good many years I have been of opinion that the well known species common to your State and our own (South Australia) (and since placed as a variety of *P. alata* by Ewart) was not conspecific with *P. reflexa* of R.Br. Then of course there was another difficulty introduced, owing to the desirability or undesirability of retaining, *P. revoluta* as a species distinct from *P. reflexa*. As you know, Benthani deliberately masses all these species together as *P. reflexa*. This was certainly the

shortest and easiest way of dealing with a very difficult problem. But I think we have now advanced sufficiently in our investigations of these three forms to admit the desirability of keeping them separate, although there are sure to be a good many intermediate forms which will give trouble in sharply defining each of the three. In the light of our more advanced experience in the various States, I feel that caution should be exercised in definitely excluding *P. reflexa*, Br., from Victoria; in fact, on looking through my herbarium, I find a few which appear to be identical (except perhaps in size) with Brown's species."

Recorded from all States, flowering from May to September.

16. *P. REVOLUTA*, R.Br. (revolute). "Autumn Greenhood."

Plant slender, from 6 to 15 inches in height; *basal leaves absent*. Stem bracts small and slender. Flower solitary, quite large, pale green or white, striped, with light brown stripes and markings. Galea long, evenly curved, extending to a long, filiform point, with a downward flexure. Lower lip long, gracefully curved inward and upwards. The long filiform points embracing and far exceeding the galea, usually wide spreading. Labellum long linear, somewhat pointed, curved outward, appearing through the galea. Column wings as in *P. reflexa*.

This beautiful Greenhood is found in autumn, its slender stem, with very small stem bracts carrying the large coloured flower, makes it a readily noticed plant. In some localities it is quite rare, while in others it is seen in considerable numbers. Flowering from March to June, and recorded from the S., S.W. and N.E. Recorded also from New South Wales.

17. *P. TRUNCATA*, Fitz. (shortened). "Brittle Greenhood."

Plant dwarf, up to 8 inches high. Leaves almost ovate in rosette stage; stem clasping and narrow lanceolate in flowering stage. Flower solitary, large. Galea long, much widened or expanded at middle and towards end; point quite blunt or truncate. Lower lip relatively small, with long very filiform points, embracing the galea and far exceeding it, somewhat recurved. Labellum linear, tapering to a fine point, somewhat twisted. Column wings wide.

The vernacular name is quite apt, for the galea is very brittle, and the flowers do not carry well. The very large flower, and the low stature, give the plant a strange dwarfed appearance. It has only been recorded from Tottenham, Sunshine, Brisbane Range, and You Yangs. The latter is the original locality, where it was discovered by W. H. Nicholls. Recorded also from New South Wales. Flowers April to June.

18. *P. ALATA*, Reich. f. (winged). "Purplish Greenhood." (Synonym, *P. PRAECOX*, Lindl.).

Plant slender, up to 10 inches high, no basal leaves at flowering time, stem leaves 3-4, small, the upper one enclosing the bud. Flower solitary, long, grey green, with brownish stripes. Galea erect and only slightly incurved, ending in a short point. Lower lip erect and upright, the sinus wide and notched, the fine points embracing the top of the galea, and exceeding it, being often bent forward. Labellum straight, short pointed, red brown at tip, having a central brownish line, raised. Upper column wings curved, lower lobes blunt and ciliated.

Known for years as *P. praecox*, this name was suitable on account of the early appearance of the flower. It is smaller than the plant hitherto known as *P. reflexa*, and of a general duller appearance. Like many greenhoods, the foliage of the juvenile plants is in the form of a rosette, having from 3 to 7 leaves. In subsequent years, as the tuber becomes stronger, frequently, but not always in the second year, this juvenile tuber becomes a flowering tuber, without basal foliage. Recorded from all parts of the State except the N.W.; and also from New South Wales, South Australia and Tasmania. Flowers from May to July.

19. *P. OBTUSA*, R.Br. (obtuse or blunt labellum). "Blunt-tongue Greenhood."

Plant more slender than No. 18, but taller, up to 10 inches high. No radical rosette at flowering time, 3-4 stem leaves, broadly lanceolate. Flower solitary, green, shaded with deeper green shades. Galea compact, the end much incurved, ending in a long fine point. Lower lip quite erect, broad at the notched sinus, the long fine points embracing the galea and far exceeding it, usually facing forwards. Labellum oblong linear, brownish, tip quite blunt or obtuse. Upper column wings toothed, lower ones blunt.

This dwarf Greenhood is at once distinguished by its blunt, reddish brown labellum, which does not project through or beyond the sinus. It is recorded from the S. and E., and also from Queensland, New South Wales, South Australia and Tasmania. It is autumn flowering, usually occurring in April-May.

20. *P. DECURVA*, Rogers (downward curved). "Red-tongue" Greenhood.

Plant slender, graceful, glabrous, radical leaves 2-3 not present at flowering, oval on long slender pedicels; bracts 4-5. Flower large, solitary, green, with slight reddish touches at points. *Galea* upright and then *much incurved and deflexed, the point long, extended* almost even with base of ovary. Lower lip erect, with wide sinus, *the filiform lobes being much prolonged*, embracing and in an upright position, far exceeding the galea. Labellum linear oblong, obtuse at apex, much recurved, and protruding through the sinus, with a raised central line, *dull red in colour*, appendage curved and trifid. Upper column wings toothed; lower wings bluntly oblong, both wings reddish in front.

This very dainty Greenhood was first brought under my notice by A. N. Burns, who found it growing freely at Lower Fern Tree Gully. It does not occur in colonies. The three long, fine, filiform points make it easily recognised, as does also the curved red tongue. It has only been found in and near the Dandenong Ranges, and in Tasmania. Flowers in December-January.

21. *P. PARVIFLORA*, R.Br. (small flowered). "Tiny Greenhood."

Plant slender, often quite small, ranging from 2 to 9 inches high, rarely up to 15 inches. No radical leaves at flowering, several small acute bracts on stem, and one below each flower. *Flowers small, several*, usually up to 5, occasionally 10 or more. Flower erect, galea much incurved, marked with dark green or brownish streaks, point somewhat blunt. Lower lip erect, wide sinus, notched, lobes embracing, but shorter than, the galea. *Labellum oblong, tip obtuse and somewhat recurved, having a central broad red line, and with a narrow line on either side*. Upper angle of column wings toothed, lower broad and ciliate.

The Tiny Greenhood has small flowers, and is often quite a diminutive plant. The erect flowers are prominent. A variety occurring in New South Wales and Tasmania is known as *P. aphylla*. It is a short stout plant.

with the flowers crowded together at the top of the stem, and not separated as in the species. The rosette of leaves often found at the base of the stem, is from a small, non-flowering tuber. It is recorded from all parts except the N.W., and also from all States except West Australia. Flowers from March to June.

22. *P. BARBATA*, Lindl. (Bearded). "Bearded Greenhood."

Plant usually robust, 4 to 12 inches high. Leaves numerous, crowded at base, especially before flowering time; also passing up the stem, and merging into stem bracts. Flower pale green, with rich green veinings and reticulations. *Galea quite erect*, ending in a short rounded point, much inflated at lower half. Lower lip with long linear points, *quite reflexed, lobes pointing downwards*. Labellum filiform, with a dilated base, ending in an unevenly rounded red brown knob, the whole portion except the knob being *covered with long yellow hairs*. Upper column wings (see plate showing labella) rounded, lower wings blunt, pointing forward.

This plant is easily distinguished by its leafiness, its beautifully veined flower, and the unusual yellow-haired labellum. It is found alike in the dry mallee, and in the coastal areas, being recorded from all parts. It is also recorded from all States except Queensland. Flowers September-October.

23. *P. MUTICA*, R.Br. (docked). "Midget Greenhood."

Plant slender, small, somewhat compact, up to 5 inches high, green. Leaves in a radical rosette; one or two stem bracts. Flowers green, quite small, 2-12. *Galea incurved, blunt; lower lip broad, reflexed, pointing downwards*. Labellum broadly ovate, tip rounded. Upper column wings rounded, ciliate margins; lower lobes bluntly triangular, ciliate.

Recorded from all parts and from Queensland, New South Wales, South Australia and Tasmania. Flowers August to November.

24. *P. CYCNOCEPHALA*, Fitz. (swan-headed—appendage to labellum). "Swan Greenhood."

Plant stout, taller than No. 22. Leaves up to 10 in radical rosette; 1-3 stem bracts. Flowers up to 10; quite small, green. *Galea incurved erect; lower lip short, reflexed pointing downwards, lobes united almost all the way*. Labellum almost circular, with broad round tip.



PTEROSTYLIS PEDUNCULATA,
 R.Br. (two flowers).
 Maroon Hood.



P. BARBATA, Lindl.
 Bearded Greenhood.



P. REVOLUTA, R.Br.



P. CURTA, R.Br..

Appendage to labellum pointing towards the tip. Upper column wings rounded, lower wings triangular, both ciliate.

Recorded from all parts but the E., and from New South Wales, South Australia and Tasmania. Flowers September-October.

These two species, Nos. 22 and 23, might be taken for the same, or for varieties. They are very similar in outward appearance, both being dwarf, and uniformly green. *P. mutica*, however, is usually stouter and shorter than *P. cyenocephala*; but the important difference between the two lies in the fact that the irritable appendage of the labellum of *P. cyenocephala* points outwards towards the tip, while that of *P. mutica*, is pointing inwards.

25. *P. PUSILLA*, Rogers (small). "Ruddy-hood."

Plant small, slender, glabrous, up to 6 inches high, green rosette of leaves at time of flowering, 2 or 3 stem bracts. Flowers 1 to 6 on slender stems, green, with rusty red shades and tints on galea, lower lip and labellum. Galea erect with short rounded point. Lower lip reflexed, pointing downwards, lobes shortly pointed. *Labellum oblong, irritable on a long claw, fleshy, concave, tip not bent, but round and blunt, lateral margins ciliate, with few hairs, under side with a deep central channel, having two pear-shaped swellings directed forwards.* Upper column wings wide, quadrangular, lower wings rounded, all more or less ciliate.

Recorded from the S., S.W., and N.E., and also from South Australia and Tasmania. Flowers September and October.

26. *P. RUFA*, R.Br. (reddish). "Rusty-hood."

Plant moderately stout and robust, from 4 to 12 inches high. Basal rosette of leaves withered at flowering time; 2-5 stem bracts. Flowers fairly large, 2-5, green, with rich red-brown markings and streaks. Galea broad, incurved, the point produced to a long fine point. Lower lip reflexed, pointing downwards, margins of concave portion ciliate, produced to long fine points, often 1 inch long. *Labellum, narrow oblong, attached by a long claw, membranous, sensitive or irritable, with an upturned blunt tip, margins very ciliate, with two long prominent bristle like hairs at base, deeply channelled on under side.* Column wings rectangular, ciliate.

Recorded from N.W., S.W., and S., and also from all the other States. Flowers November-December.

27. *P. SQUAMATA*, R.Br. (scaly—referring to bracts).
"Scaly Greenhood."

Plant stout, up to 9 inches high. Leaves in a withered basal rosette at flowering time; stem bracts up to 8. Flowers dull green with red markings, up to 4, on long stems. Galea incurved, produced to a fine point. Lower lip reflexed, pointing downwards, lobes produced to fine points. Labellum *thick and fleshy*, glandular, *irritable*, ovate oblong, the *tip upturned and bifid*, margins thickened, *ciliate with long hairs*. Column wings almost square, lower ones ciliate.

Recorded from S. and N.E., and also from South Australia and Tasmania. Flowers November-December.

28. *P. MITCHELLII*, Lindl. (after Sir Thos. Mitchell).
"Mitchell Greenhood."

Plant slender, up to 10 inches high. Leaves in a green basal rosette at time of flowering, stem bracts 2-4. Flowers fairly large, up to 6, green with rich red tints and markings. Galea upright, recurved, the point finely produced. Lower lip reflexed, pointing downwards, having a spreading sinus, the two lobes produced into long points very divergent. Labellum *thick, fleshy, glandular, irritable, slipper shaped*, tip depressed and *slightly bifid*, under surface channelled, margins ciliate except at the contracted basal portion. Upper column wings acute, lower blunt, both ciliate.

Recorded from S.W., and S.; and also from Queensland, New South Wales, Tasmania, and South Australia. Flowers August-October.

The above four species represent what is known as the "Rufa" group of Greenhoods. Originally all were "lumped" together as one species, but were gradually separated, *P. pusilla* forming the last member of the group. Critical examination has disclosed the fact that *P. squamata* may not be found in Victoria, but one specimen in my herbarium from the N.W., seems to agree with that species. All four species are fond of somewhat dry and hillside conditions.

The differences between the four species are clearly set out by Dr. Rogers, in *Trans. Roy. Soc. Sth. Aust.*, vol. xlii., 1918. Briefly they are as follow:

P. pusilla. Labellum fleshy, tip straight. Rosette green.

P. rufa. Labellum membranous, tip upturned. Rosette withered.

P. squamata. Labellum fleshy, lip upturned. Rosette withered.

P. Mitchellii. Labellum fleshy, tip depressed. Rosette green.

29. *P. LONGIFOLIA*, R.Br. (long-leaved). "Tall Greenhood."

Plant robust and rigid, dull green, up to 20 inches high. Stem leaves up to 8, larger towards the centre, small and bract-like at base, no basal rosette. Flowers small, green, up to 8, rarely more. Galea somewhat incurved, not produced to a fine point, carried almost horizontally, in two shades of green. Lower lip reflexed, pointing downwards. Labellum irritable, oblong, glandular, slightly three-lobed at end, tip upturned and bifid, base thick and solid. Upper column wings bluntly toothed, lower elongate, frontal margins ciliate.

The Tall Greenhood is a winter to spring flower, the latter season being for mountain plants. It inhabits forest and shady hill country. The irritable labellum is very sensitive to the touch, springing inwards, but slowly returning after the lapse of about half an hour. The tall, several flowered, green plant is readily recognised.

Recorded from all parts of the State and from all States except West Australia. Flowers from July to October.

30. *P. VITTATA*, Lindl. (banded). "Banded Greenhood."

Plant rather robust, similar in habits of growth, flowers and foliage to No. 29, except that it is shorter and stouter, the flowers being much larger. Plant up to 15 inches high. Flowers up to 8, *very pale green, with reddish or purplish brown bands*. Galea broad and long, ending in a short acute point. Lower lip reflexed, pointing downwards, wide, ovate, lobes with acute, short points. Labellum irritable on a long claw, broadly oblong, glandular, point, tip upturned and bifid; margins ciliate, the base thickened, carrying a short and thick point or spike. Upper lobes of wings bluntly toothed; lower narrow and ciliate.

The Banded Greenhood is often found amongst tea tree and other scrub, right along the coast, as well as inland. The grey pale green, and rich brown markings are very distinct. Occurring in winter, it is often missed by collectors. Recorded from all parts except the N.E.; and also from Tasmania, South and West Australia. Flowers May to July.

NEW SPECIES.

With the passing of years and the increase of interest and study in Orchidology, it is only natural that new forms and species should be discovered. When Barnum von Mueller wrote his "Key" (1888), he published 78 species of orchids for Victoria. Now we have over 150.

Since this work was commenced new records have been made, and more than half a dozen new species must be added to the list.

Three new *Prasophylla* have been collected; one from Lara, by Rev. A. C. F. Gates, M.A.; one from Ringwood, by C. French, Jr.; and one from Bairnsdale, by T. S. Hart, M.A. (*Prasophyllum Hartii*). These are all moderately tall, spring flowering species. A new *Calochilus* (*C. imberbis*, Rogers) has been collected from Rushworth by Mrs. Rich: this is a unique *Calochilus* without a beard. A new *Diurus* (*D. fastidiosa*, Rogers) has been recorded from Tottenham district by W. H. Nicholls.

A. J. Tadgell and others have recorded *Caladenia alpina*, Rogers, from Mount Bogong. I understand that C. French, Jr., collected this orchid 30 years ago on Mount Hotham, but von Mueller recorded it as *C. carnea*. A. J. Tadgell has also re-collected Mueller's *Thelymitra Elizabethae* (named after Mrs. McKibbin) from Ringwood, originally collected near Camberwell. Mr. Tadgell courteously supplies field details of these two orchids.

THELYMITRA ELIZABETHAE, F.v.M.

Plant slender. Flower small, solitary, rarely 2. Colour red, with reddish stems. Leaf solitary; one stem bract. Summit of column denticulate and V cleft. Summit of column yellow at back: back of wings dark red. Anther crest erect, and very prominent; 2 crested appendages slightly fringed. Usually tardily opening on a warm day, closing firmly. Flowers in October.

It differs from *T. carnea* in being a more slender plant, with smaller flowers, darker stems and flower; summit V spaced instead of closed. The summit of column is yellow instead of red as in *T. carnea*. The 2 crested appendages are fringed and not denticulated. *T. carnea* readily opens and is closed loosely.

CALADENIA ALPINA, Rogers (alpine).

Plant robust up to 11 inches high. Stem reddish, glandular hairy, clasping bract pointed above middle of

stem. Leaf thick, broad, pointed, with scattered hairs, usually as long as, sometimes longer than the stem; 3 thick lines. Flowers 1-2, rarely 3. Bract sheathing. Dorsal sepal rigid concave and incurved, broad ovate, almost inclosing labellum. Lateral sepals concave, broad, elliptic, standing out. Petals falcate, flat, broad, spreading. Segments free and equal. Ovary elongate, slender, hairy, green, 3 prominent red angles. Labellum ovate, concave, on short claw. Lateral lobes erect, entire margins; on half its length transverse stripes; then about 6 teeth like lobes on either side of middle lobe: membranous edges slightly ciliate: lamina with 2 erect thick yellow calli at posterior end: 6 rows of clubbed yellow calli, followed by 4 rows of yellow calli on middle lobe, then 4 rows of small white calli to anterior lobe. Column cleft where wings join anther. Wings narrow, red lined. Anther pointed, incumbent.

Flowers in January at Mount Bogong.

CALADENIA CARNEA, R.Br., var. *AURIANTICA*, Rogers.

It is quite probable that this variety from Alburyton (A. J. Tadgell) will be raised to specific rank when more material is collected. The orange-coloured labellum is very distinct.

ACKNOWLEDGMENTS.

The descriptions of the genera have been chiefly taken from Bentham and Mueller's "*Flora Australiensis*," which is the standard reference work for Australian Botany.

Very considerable help has been obtained from the wonderful and quite unique stereoscopic photographs of Mr. T. Green. It is very easily possible to describe any orchid by the use of these splendid pictures.

A very free use has been made, by special permission, of the descriptions of the species of orchids by that eminent orchidologist, Dr. R. S. Rogers, M.A., F.L.S. It is impossible to give finer descriptions than those given in the Doctor's works; and no Australian student can afford to be without these. Indeed, the descriptions are so complete and so perfect, that they stand as a model for all orchid students. Australian students are so steeped in the work of Dr. Rogers, that any work done at all, is merely a reflection of his own. His help, generously given at all times, is also characteristic, and I cannot be too grateful for all the help and advice that have been so readily accorded, and so freely used.

POLLINATION OF THE ORCHID *CRYPTOSTYLIS*
LEPTOCHILA.

BY (MRS.) EDITH COLEMAN.

An interesting, but perplexing, problem has presented itself in connection with the pollination of the Small Tongue-orchid, *Cryptostylis leptochila*. Early in January my daughter described to me certain remarkable actions on the part of a wasp, which she had observed visiting the flowers of *C. leptochila*. It entered the flowers *backwards*, instead of in the usual manner of nectar-feeding wasps; the tip of the abdomen appeared to be imbedded in the stigma of the flower, and, in every instance, the insect freed itself with a jerk, which shook the stem and suggested resistance.

Investigations fully bore out her statements, and added further unusual observations which, though they have so far puzzled several leading entomologists, have adduced at least two important facts in connection with the pollination of this orchid. At Upwey and Belgrave, where *C. leptochila* is fairly numerous, we watched many of these insects visiting the flowers, and always they *backed* into them. They seemed to come from the trees, never from the ground; and each would dart instantly into a flower, *backwards*, without any attempt to locate a possible victim in the shape of a moth larva, and with no apparent interest in any flower other than the one selected.

After backing into the stigma, the end of the wasp's body took an inward falcate curve, and the base of the flower's labellum appeared to be gripped by the claspers. This curve of the end, brought the abdomen just in position for the upper-surface, at about the second last ring, to rest on the flower's prominent rostellum, with its dark-coloured disc. The insect quivered for a moment, and then became motionless. After a second or two, it freed itself, with an apparent effort which shook the flower. Resistance by the blossom could be plainly felt when we withdrew the insect with our fingers. In every instance, when we gave it time enough, the effort was sufficient to release the pollinia, which, with the viscid disc, were carried off by the insect on the tip of its abdomen, never on any other part of the body. Owing, no doubt, to this resistance, pollen was frequently deposited on the stigma of the same flower, and more was probably carried to the stigma of the next flower visited.

Some of the insects bore pollen before they entered our flowers, while others took away more than they brought. It took at least a second to complete the act, and if we disturbed the wasp too soon, no pollen was abstracted. The insects were identified as *Lissopimpla semipunctata*, Kirby. Theoretically, being Ichneumon-flies, they should not be interested in the flowers, except in so far as they may harbour moth larvae, or secrete nectar; yet I think we have proved that neither larva nor nectar was the object of their visits to the flowers. Their swiftness suggests either exceptionally sharp eye-sight or keen sense of smell. It may be both.

Though, to our senses, the perfume of the Small Tongue-orchid is not very pronounced, I think it may, in the first instance, lure the insects to the flowers from quite a distance, for most of my experiments have been made on very hot days, when orchid-perfumes are usually more powerful, and when there has been a breeze. But I think it cannot be scent only, for the insect has no further interest in a flower once the dark-brown disc has been removed, though the perfume has possibly not decreased with its removal. Can it be that the rostellum, with its dark disc, holds the key to the solution? Roughly, in shape and colouring, the labellum somewhat resembles the body of the insect visitor. As the flower matures, the curve taken by the labellum with its upright posterior margins, so exactly meets the needs of the wasp, that one is easily tempted to hazard a theory.

From the shape and structure of its essential organs the service of an agent is necessary in the pollination of this orchid, whether with pollen brought from another plant, or pollen from the same flower. So far as the benefit to the orchid is concerned, I am satisfied, but I am not an entomologist. I have set out the essential facts in the hope that some reader versed in entomology may be able to elucidate something more definite. The only facts we feel that we have confidently established are:—

1. That *Lissopimpla semipunctata* visits the orchid purposely, and enters the flower backwards.

2. That it successfully effects pollination, and therefore can be regarded as the orchid's agent—possibly its only one. Though most of the insects were identified as males, we searched the flowers for trace of eggs or moth larvae, but the microscope revealed nothing.

What, then, was the payment exacted by the insects

for the service it undoubtedly rendered? The fact that it is not deterred by any slight discomfort, from making subsequent visits, would suggest that it has in some way received payment for its former visits.

The accompanying photographs were taken by Mr. T. Green, a former member of this Club. They show the insect in the act. The flowers were snipped off into a killing bottle while the wasp was oblivious to our presence, and were photographed with their visitor after having been in formalin for over a week.

EXCURSION TO CLEMATIS.

Twelve members and friends attended the excursion to Clematis Gully, on March 19th. At Belgrave Mr. O'Donoghue, Forest Officer, met us, and kindly drove several of the ladies to the Gully in his car. The remaining members of the party walked about two miles, to South Saxafrax. We were at the Gully before noon. The leader planted a tree, *Eugenia Smithii* (brought from the Botanic Gardens by Mr. P. R. H. St. John) on the north side of Clematis Avenue. We then proceeded to explore the Gully for ferns, which are readily collected here in pleasing variety, as the specimens exhibited testify.

Permission to collect ferns for Club purposes, had kindly been given by the Forests' Commissioners. Mr. St. John has been able to determine, from the specimens thus obtained, the specific differences between *Dryopteris decomposita* and *D. glabella*, and definitely to add the latter to the list of Victorian ferns.

We visited Dr. Glendinning's garden, which is close to the Gully, and, after lunch on the balcony of the house, viewed a noble collection of Conifers and other trees, including a number of Australian species. Waratahs from New South Wales, showed remarkably robust growth. Returning to the Gully, we made further investigations among the ferns. Later we walked along the Sherbrook road and entered the Forest area, passing through a portion that recently was planted with trees by the pupils of various schools, under the direction of Forest Officers. At the head of the Gully, Lyre-birds were heard calling, and some were observed at their dancing-mounds.

The following is a list of the 22 ferns of which specimens were obtained and mounted, and are exhibited here to-night:—

Bristle Fern, *Trichomanes venosum*; Austral Filmy Fern, *Hymenophyllum australe*; Shining Filmy Fern, *H. flabellatum*; Soft Tree Fern, *Dicksonia antarctica*; Rough Tree Fern, *Alsophila australis*; Shining Shield Fern, *Dryopteris decomposita*; Smooth Shield Fern, *D. glabella*; Ground Polypody, *D. punctata*; Common Shield Fern, *Polystichum aculeatum*; Leathery Shield Fern, *P. adiantiforme*; Necklace Fern, *Asplenium flabellifolium*; Gristle Fern, *Blechnum cartilagineum*; Fishbone Fern, *B. discolor*; Leather Fern, *B. levigatum*; Lance Fern, *B. lanceolatum*; Common Maiden-hair Fern, *Adiantum zethiopicum*; Batwing Fern, *Histiopteris incisa*; Common Bracken, *Pteridium aquilinum*; Finger Fern, *Polypodium Billiardieri*; Scented Polypody, *P. diversifolium*; Mother Spleenwort, *Asplenium bulbiferum*; Shade Spleenwort, *Athyrium umbrosum*.—F. FITCHER.



ICHNEUMON-FLY visiting flowers of *Cryptostylis leptochila*.

THE PLATYPUS BOOK.

Australian zoologists are setting botanists an excellent example. Instead of census lists, useful indeed, but unsatisfying to those who are eager for more than a knowledge of names, we have now a choice of books on native animals that may be read for pleasure as well as for instruction, and not merely opened for reference. The latest addition to real natural history books is "The Platypus," by Harry Burrell, C.M.Z.S. The publishers are Messrs. Angus and Robertson Ltd. (Syd.), whose imprint appears on so many worthy volumes, notably Dr. R. J. Tillyard's "Insects of Australia and New Zealand."

Mr. Burrell, widely known as a field naturalist, has devoted practically a lifetime to studying our wonder mammal, chiefly in its native haunts; and he must be regarded as the foremost authority on the habits and life history of *Ornithorhynchus anatinus*. He gives us, in this fascinating book, the results of his observations and research work. The Platypus *lives* in the pages and illustrations. The volume is a Boswellian biography, one might say: Chapters deal with the discovery and early descriptions of *Ornithorhynchus*, controversy on its zoological position and the laying of eggs, general characteristics, nesting burrow, breeding habits, etc. The illustrations include a coloured plate, and many half-tones from photographs.

The Platypus was originally described, in print, in 1799; and when specimens were first brought to Europe, many naturalists considered them to be "fakes," due to the misapplied skill of the Chinese who delighted, while they deluded, Europeans in quest of the marvellous. Even after *Ornithorhynchus* had been generally recognised as a product of nature, and not of artful Orientals, controversy continued, as regards its zoological position, its egg-laying habit, and so forth. It was a most puzzling animal to the savants of Europe for nearly a century. In some respects it is puzzling still; though Mr. Burrell's book makes plain much that hitherto has been mysterious. He remarks that a great deal of anatomical investigation remains to be done. But, so far as studies of the living Platypus are concerned, no one is ever likely to reap a harvest nearly so rich as that which has rewarded Harry Burrell's devotion to the most wonderful of all existing mammals. Every Australian nature lover should read his book. It is "intended mainly for general readers," but is also truly scientific.

It is not practicable to produce popular books dealing in detail with all the native plants of even one state, but should we not have readable handbooks to the Ferns, the Orchids, the Eucalypts, the Acacias, etc., and general wildflower books, on the lines of those numerous guides to the floras of European countries and America?—C.B.

REPORT OF PLANT RECORDS COMMITTEE.

The following is a list of new Victorian Records established recently—chiefly by members of the Field Naturalists' Club—which will be included in the forthcoming supplement to the *Census of Victorian Plants*. The list excludes alien plants.

By Mr. C. Barrett, C.M.Z.S.: In East Gippsland:—*Pultenaea Resunderiana*, new for East; *Trichomanes caudatum*, new for Victoria.

By Mr. F. Barton, Jr: At Foster: *Epacris lanuginosa*, *Lepidosperma semiteres*, *Cladium acutum*, *Cladium tetragonum*, *Eucalyptus Kitsoniana*, *Burnettia cuneata*, *Thelymitra grandiflora*, *Veronica peregrina*, *Utricularia lateriflora*, *Thelymitra pauciflora*, *Sagina procumbens*, *Tetrarrhena distichophylla*, *Prasophyllum Archeri*. At Sperrin Whale Head:—*Prasophyllum nigricans*, *Glycine tabacina*, *Frankenia pauciflora*, *Bucckea ramosissima*, *Cotula integrifolia*, *Triglochin minutissima*, *Amyanthus Freisianus*, *Lepturus incurvatus*, *Gypsophila tubulosa*; all new for East.

By Miss Erica Barton: At Foster:—*Prasophyllum Frenchii*, *Calochilus cupreus*. At Ocean Grange:—*Olearia glutinosa*; new for East.

By Miss J. Galbraith: At Tyers:—*Cladium tetragonum*, *Grevillea rosmarinifolia*, *Olearia stellulata*. At Bulga Park:—*Prostanthera melissifolia*; new for East. At Beechworth:—*Prostanthera nivea*, *Pterostylis Mitchellii*, *Thelymitra grandiflora*, and *Caladenia cucullata*; new for N.E.

By Rev. A. C. F. Gates, M.A.: At Geelong:—*Amphipogon strictus*. At Lara:—*Triglochin minutissima*, *Eragrostis pilosa*, *Stipa aristiglumis*, *Rumex crystallinus*, *Kochia humillima*, *Psoralea parva*, *Festuca Hookeriana*; new for South. At Dingee:—*Eragrostis pilosa*; new for N.W. At Lorne:—*Hymenophyllum rarum*; new for Victoria.

By Mr. Maurice Keppel: At Buxton:—*Eucalyptus Perriniana*; new for South.

By Mr. V. Miller: In East Gippsland:—*Grevillea Victorice*; new for East.

By Mr. P. F. Morris: At Colac:—*Chamaeraphis spinescens*, grass; new for South.

By Mr. D. J. Paton: In Bendigo District: *Asplenium flabellifolium*, *Anogramma leptophyllum*, *Notholaena distans*, *Kyllingia intermedia*, *Lepidosperma filiforme*, *Carex pseudo-cyperus*, *Lomandra multiflora*, *Prasophyllum nigricans*, *P. odoratum* (album), *Thelymitra aristata*, *T. carnea*, *T. Macmillanii*, *T. luteo-ribinata*, *Microtis parviflora*, *Calceana major*, *Cyrtostylis reniformis*, *Caladenia caerulea*, *Caladenia carnea*, *Diuris alba*, *D. palachila*,

D. sulphurea, *Pterostylis alata*, *P. pusilla*, *P. parviflora*, *P. revoluta*, *Persoonia rigida*, *Grevillea lanigera*, *Marianthus macumbons*, *Acacia dealbata*, *A. decurrens*, *A. leprosa*, *A. lanigera*, *A. retinodes*, *Decasium varians*, *Hibbertia acicularis*, *Pinetia spathulata*, *Eucalyptus elaeophora*, *E. macrorrhyncha*, *Baeckea ramosissima*, *Halorrhagis tenaxioides*, *Astrorhiza ledifolia*, *Melichrus urceolatus*, *Logania floribunda*, *Prostanthera hirtula*, *Veronica perfoliata*, *Stylidium despectum*, *Olearia floribunda*, *Humca ozathamnoides*, *Helichrysum obcordatum*; all new for N.W.

By Mrs. Rossiter: At National Park, Wilson's Promontory:—*Cryptostylis leptochila*; new for East.

By Miss Daphne Rhodes: At Gellibrand River:—*Olearia stellulata*; new for S.W.

By Mr. A. J. Tadgell: At Mount Fainter:—*Carex stellulata* and *Euphrasia antarctica*, hitherto doubtful records for Victoria; *Ewartia nutigena*, *Geranium sessiliflorum* and *Pratia puberula*, hitherto recorded only from "Cobberas." At the "Alps":—*Agrostis venusta*, *Diachelachne sciurea*, *Urtica incisa*, *Didiscus Benthamii*, *Halorrhagis tenaxioides*, *Scirpus setaceus*, *Hymenanthera dentata*, *Juncus plebejus*, *J. prismatocarpus*; new for N.E. At Healesville:—*Veronica serpyllifolia*. At Werribee Gorge: *Halorrhagis elata*; new for South.

By Mr. H. B. Williamson, F.L.S.: At Moonlight Head:—*Thelymitra grandiflora*; new for S.W. At Omeo:—*Wilsonia rotundifolia*. On Bogong High Plain:—*Brachycome alpina*, Morris; new to Science. At Chiltern: *Swainsona Morrisiana*, J. M. Black; new to Victoria, also collected by D. McLachlan, in Wimmera.

EXCURSION TO MENTONE AND BLACK ROCK.

A party of 14 members and friends took part in the excursion from Mentone to Black Rock, on Saturday afternoon, April 9th. On arrival at Mentone station, we directed our steps to the beach, where the many varieties of seaweeds, ranging from pale pink to deep green in colour, were much admired. Mr. W. H. A. Roger exhibited an interesting collection, which he had pressed on cards. A number of crescent-shaped pieces of a jelly-like substance were observed lying about the beach, which, on examination, were found to contain thousands of minute fish-ova. On reaching the southern end of the beach, we ascended the cliffs, and walked to the fossil-beach at Beaumaris. Some time was spent here, but, though the tide was conveniently low, only a few fossils, including a shark's tooth, were found. Several of the curiously spiral-shaped egg-cases of the Port Jackson Shark were examined.

The coast line was then followed, partly on the cliffs and sometimes on the beach, a large flock of Silver Gulls being observed on a reef some distance from the shore, while nearby, several Pacific Gulls and Cormorants were perched on some rocks. Six Black Swans were also noticed, close in-shore. We viewed an interesting relic of the early days, consisting of four high walls built of irregular blocks of local stone roughly cemented together, and enclosing a courtyard, the object, I understand, having been to afford protection from the aborigines.—L. J. HANCOCK.

NOTES ON ANT-LIONS.

The family Myrmeleontidae is the dominant one of the Order Neuroptera, Dr. R. J. Tillyard states, and is perhaps better known from its familiar larval forms, the "ant-lions," rather than from the adult lacewings. (Insects of Australia and New Zealand, p. 323). In Australia there are 36 genera and 95 described species; but little is known concerning the habits of our ant-lion lacewings; and keen observing and collecting would certainly be rewarded.

Referring to lacewings generally, in a recent letter, Dr. Tillyard informs me that most of them, including all the ant-lions, are to be found in the drier parts of Australia. If one goes inland into the back country of Victoria or South Australia, or, better still, towards Central Australia, they will be found in thousands. There are many new species yet to be discovered.

I first became interested in ant-lions and other lacewings in Egypt, which is the homeland of some wonderful species of Nemopteridae, insects with very long and slender hind-wings, which are trailed behind them like filaments, when the flies flutter among the sand-dunes of the desert. Around the Pyramids at Gizeh, I observed numerous pit-falls, made by ant-lions. It is doubtful whether pits are formed by Nemopterid larvae, which are similar in appearance to ant-lion larvae, but have long and slender necks. This group is represented in northern Australia, ranging from the West to Queensland.

Though ant-lions are much more abundant in our mallee country, some species are fairly numerous around Melbourne. I have seen many pits, for example, on the cliffs at Brighton Beach, where spray from storm-waves could reach them. On the heath-grounds at Black Rock, a species of *Glenoleon* may be seen occasionally, in weak, fluttering flight, or resting on leaf or twig with its long wings folded. A fine ant-lion, with beautifully marked, falcate wings, was captured in a city building, in the daytime. It was, probably, a specimen of *Periclystus circuitus* Walk.

In the Linga district, Vic., Mr. F. E. Wilson and I saw ant-lion pits in hundreds, around bushes and trees, where the sand was fine and loose, as if it had been sifted. Rarely a larva was observed travelling among the pit-falls, its movements almost as queer as its appearance.

It is the popular belief that the larvae of all species of ant-lion lacewings form the conical pit-falls that gains for them "easy" meals; whereas those of only two Australian genera, *Myrmeleon* and *Callistoleon*, are known to do so, Dr. Tillyard states. However, the most of the larvae live secretly in sand or debris. They are not captured without difficulty, in my experience. Failure is frequent when one tries to dig out ant-lion larvae: they seem to melt into loose, clinging sand.

Some of our ant-lions are rare, or are seldom met with in the adult, "lacewing" stage; others are moderately plentiful, or abundant. Many species are handsome insects; others are drab-colored, and easily overlooked at very close range, when they are resting.

The larvae of *Myrmeleon* (nine Australian species) form the pit-falls most commonly seen in sandy places; often on the fringe of frequented ways, and even in yards and gardens. Beneath a house or other building, in dust or sandy-soil, ant-lion pits may be found. Ants are among the common victims that glissade into the ant-lion's gaping, calliper-like jaws, just showing in the centre of the bottom of the pit: but small insects of many kinds are snared.

Ant-lions were known to the ancients; and in Latin Bestiaries of the Middle Ages, accounts of the "Mirmicalcon" are given. The life history of the ant-lion (*Palpares libelluloides*), in its legendary form, has been traced by G. C. Druce, F.S.A. His paper, erudite, but highly entertaining, probably has been overlooked by many naturalists: it appears in *The Antiquaries Journal* for October, 1923.—G. BARRETT.

With this issue a new volume of the *Naturalist* begins; and our aim should be, to make it the best of a long series. Contributions for the "Field and Study" section especially are desired. Members are invited to help the Editor, by contributing more freely.

Often an exhibitor might hand in a note, dealing generally with his exhibit. Many interesting happenings in Nature are observed, but not recorded, by Club members. Nature notes, certainly, are popular; and several pages of each number of our journal should be devoted to them.

Articles, not too lengthy, will also be needed during the ensuing Club year. Specialists who will write in a popular way, make their studies of general interest, could help much by contributing to the *Naturalist*.



DWARF SUGAR GUM TREE.

The importance of the Sugar Gum, *Eucalyptus cladocalyx*, F.v.M., to Australia is not fully realised until one visits such towns as Horsham or Warracknabeal, or such districts as Lismore and Cressy. In the Lismore district, there are miles of gum tree plantations, Sugar Gums and other species, grown for wind breaks and shelter belts.

The one detrimental feature of the Sugar Gum is its quick growth, which produces a tree with a very fine top of limbs and foliage, but devoid of any growth for 10 ft. to 15 ft. up. Thus, while a belt of Sugar Gums may break the wind over a large area, it provides little shelter for stock in cold weather.

Attempts have been made to interplant the belts with such low-growing gums as *E. Lehmannii*, but the work has not always been successful.

While at Beaufort recently, I heard of plantings of a "dwarf" Sugar Gum, which was interplanted with the ordinary Sugar Gum, the combination thus giving a complete shelter belt from top to bottom. Mr. Hooke, of "Yerabin," Buangor, first mentioned it, telling me that Cr. H. Troy, and the Hon. Theodore Begg, M.L.C., both grew the gum extensively. Pursuing enquiries, and obtaining specimens, I ascertained that there was really a dwarf Sugar Gum, or a dwarf variety of *Eucalyptus cladocalyx* in existence. Later I found that Dr. C. S. Sutton is well acquainted with the tree, which, he says, is both dwarf and bushy, and, in the sun, presents a golden tint of foliage.

I predict a wonderful future for this dwarf tree. Its importance can as yet be hardly realised. But it is certain that in the future literally millions of plants will be planted all over the Commonwealth. Tree planters have been looking for a gum tree, carrying all the desirable characteristics of the Sugar Gum, without its undesirable long bare trunk. And here Nature has given it to us, in the form of a seed variation, which wonderfully and fortunately comes true from seed. The one detrimental feature of the Sugar Gum has thus been removed for us, by this great gift of Nature.—E. E. PESCOTT.

WEeping MAHOGANY GUM.

In the Camberwell Gardens, there is a very fair specimen of a weeping Mahogany Gum, *Eucalyptus botryoides*. The boughs of the tree are of a distinctively weeping form, while the branchlets are very pendant in character. Such a specimen is evidently a seed variation, for the upright character of the Mahogany Gum is well known.—E. E. PESCOTT.

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No. 522.

FIELD NATURALISTS' CLUB OF VICTORIA.

A special meeting of the Club was held in the Royal Society's Hall, Victoria-street, on Monday, May 9th, 1927. The President, Mr. E. E. Pescott, F.L.S., occupied the chair, and about 90 members and visitors were present.

In accordance with notice of motion given at the previous special meeting, Mr. A. J. Tadgell moved that Rule 7 be altered to read:—"The first year's subscription of any newly-elected member shall be paid in full on his or her election as a member of the Club." Mr. A. L. Scott seconded the motion. Mr. G. Coghill moved an amendment, that the Rule be altered to read:—"Persons elected as members of the Club, after the first day of November in any year, shall pay half the ordinary subscription to the end of the Club's year (April 30th), and thereafter the full subscription shall become payable on the first day of May each year." This was seconded by Mr. H. B. Williamson. After some discussion, the amendment was put to the meeting and lost. The motion was then put, and carried by a large majority.

The special meeting then closed, and the ordinary meeting was held.

REPORTS.

Reports of excursions were given as follow:—Macedon, Mr. E. E. Pescott; Zoological Gardens (substituted for Agricultural School, owing to illness of the leader, Mr. L. L. Hodgson).

ELECTION OF MEMBERS.

The following were elected as ordinary members:—Miss Gladys Smith, 39 Fitzroy-street, St. Kilda; Mr. G. W. Tranter, 23 Embling-road, Malvern; Mr. A. E. Proudfoot, Evandale-road, Malvern; and Mr. E. J. Roberts, 6 Davies-street, Moonee Ponds. As country member:—Mrs. B. M. Cooke, "Heathlands," Toolangi. As Associate Member:—Master Chas. Ostberg, McIndoe-parade, Mordialloc.

GENERAL.

The President welcomed Mr. Burrows, of the Horticultural Society of New South Wales. Mr. Burrows briefly responded.

The Hon. Secretary reported that the proposed Natural History Exhibition would be held in the Independent

Hall, Collins-street, on the afternoon and evening of Wednesday, July 20th next. A sub-committee had been appointed to arrange details, and the support and assistance of members and friends in exhibiting specimens illustrating the various branches of natural history, would be appreciated by the committee.

The President announced that a conference of the various Societies interested in the preservation of the Sherbrooke Gully and Forest in its natural state, had been held, and, as a result, a deputation had waited on the Forestry Commissioners, who undertook to discontinue the planting of conifers and exotic trees in the area under their control, and promised that strict supervision would be maintained to ensure the preservation of the natural flora and fauna. The Commissioners had further agreed to appoint a number of honorary forest officers, one nomination to be submitted from each Society represented. In view of this, the Committee had paid him (Mr. Pescott) the honour of nominating him as the representative of the Field Naturalists' Club. Mr. G. Coghill moved that the action of the Committee in this matter be endorsed. This was seconded by Mr. F. G. A. Barnard, and carried unanimously.

Mr. A. D. Hardy stated that the necessary arrangements for the formal declaration of Sperm Whale Head as a temporary National Park were now being proceeded with, and the proclamation would be gazetted very shortly. Although the reserve would only be of a temporary nature in the meantime, he fully expected that it would eventually be made permanent, as in the case of the National Park at Wilson's Promontory.

ELECTION OF AUDITORS.

On the motion of Mr. F. Pitcher, seconded by Mr. F. G. A. Barnard, Messrs. C. A. Lambert and W. H. Ingram were elected Auditors for the year.

NOMINATION OF OFFICE-BEARERS, 1927-28.

Nominations were received as follow:—

President: Mr. E. E. Pescott, F.L.S. (proposed by Mr. G. Coghill, seconded by Mr. F. G. A. Barnard). Vice-Presidents: Mr. P. R. H. St. John (Mr. A. D. Hardy and Mr. F. Pitcher); Mr. A. E. Keep (Mr. A. S. Blake and Mr. H. B. Williamson). Hon. Treasurer: Mr. A. G. Hooke (Mr. G. Coghill and Mr. H. Hughes). Hon. Librarian: Dr. C. S. Sutton (Mr. A. D. Hardy and Mr. F. G. A. Barnard). Hon. Editor: Mr. C. Barrett,

C.M.Z.S. (Mr. A. E. Rodda and Mr. L. L. Hodgson). Hon. Secretary: Mr. L. L. Hodgson (Mr. C. French, Jr., and Mr. J. Ingram). Hon. Asst. Secretary and Librarian, Mr. H. B. Williamson, F.L.S. (Mr. F. G. A. Barnard and Mr. F. Pitcher). Committee: Messrs. C. Daley, B.A., F.L.S. (Messrs. H. Hughes and G. Coghill), F. Chapman, A.L.S. (Messrs. A. D. Hardy and C. A. Lambert), J. A. Kershaw, F.E.S. (Messrs. F. Pitcher and W. Thorn), J. W. Audas, F.L.S. (Messrs. P. R. H. St. John and L. L. Hodgson), and V. Miller (Messrs. L. L. Hodgson and C. Barrett).

PAPERS, ETC.

By Miss R. S. Chisholm, B.A.: "A Chat on Canada." An account was given of the climatic and physiographical features of Toronto and other parts of Canada, and reference was made to many aspects of nature observed in that country. Miss Chisholm's remarks were illustrated by an interesting series of lantern slides.

By Mr. G. Coghill: "A Holiday in New Zealand." Owing to the lateness of the hour, it was necessary to postpone the reading of this paper.

EXHIBITS.

By Mrs. E. Coleman: Ichneumon Flies (*Lissonimpha semipunctata* (Kirby), after visiting the orchid *Cryptostylis leptochila* (F.v.M.), showing curve of abdomen, and complete pollinarium on each one.

Exhibited by Mr. A. J. Tadgell: Hyacinth Orchid, with branching stems. Collected at Wandin, May, 1927. No. 1 stem, 3 feet 6 inches in height; No. 2 stem, 18 inches, about 4 inches from base; No. 3 stem, 3 feet 4 inches, about 2 inches from base. Usually a *Dipodium punctatum* orchid has only one stem with flowers. It is very rarely found with more than one simple stem, but several flower shoots may spring up close together from underground. The flat pseudo-stem No. 3 suggests a last season's shoot. No. 2 shoot appears to have been the original stem, as the seed pods are best developed. This evidently had a side shoot, that, for some reason, assumed the lead, as No. 2 stem is only half the diameter in thickness, half the height, with only half the flowers of No. 1.

By Mr. W. H. Ingram: Collection of sea-weeds from Beaumaris, mounted on cards.

By Miss C. C. Currie (Lardner), per Mr. L. L. Hodgson: Specimen of large goat moth, captured at Lardner.

By Miss R. Rigg: Collection of water-color paintings of New Zealand flowers, etc.

By Mr. G. Coghill: Collection of herbarium specimens of New Zealand flora.

By Mr. V. Miller.—Gecko lizard, found in a rolled-up blind at State Government House, Melbourne.

HUDSON BOOKS AND LETTERS.

Members of the Club who possess first editions of books by W. H. Hudson, the English Naturalist, are fortunate. These volumes are now eagerly sought by collectors, and prices range high.

Recent quotations indicate that a slender volume in my library, purchased for 1/6 years ago, is worth about £5 now. Another of my "Hudsons," which cost me 14/., is worth £12, according to a London bookseller's catalogue. Hudson's letters, also, are bringing big prices overseas—up to £15/15/.. Everything he wrote is treasured.

Not to have read Hudson, is to have missed some of the noblest English prose: Hudson was a great writer, and wild nature most often was his theme. He hated all the enemies of wild life, but most of all collectors of bird skins and nest robbers.

Writing to me, long ago, Hudson said: "Those who read 'The Naturalist in La Plata,' do not know, or consider, that it gives the compressed results of 20 years or more of observation and meditation, and it consequently gives the impression of an exuberant nature and of great abundance and variety of wild life. All books about Nature must, in a measure, produce that false impression owing to the necessity the writer is under of selecting his facts, and, finally, only the best and most important." Hudson believed that a book on Australian wild life, might be written, to rival in interest his "La Plata." But he wrote with a golden pen of genius. We have no Hudsons in Australia. Nor is there living in any country, a naturalist who, as a literary craftsman, may be ranked with the author of "Hampshire Days."—C.B.

During January I found a Platypus and an Echidna that had met their fate at the hand of man. The Platypus had been killed by workmen engaged in removing rushes from a portion of the Olinda Creek, at Lilydale, and the Spiny Ant-eater had been destroyed by some campers on the Cardinia Creek, at Upper Besconsfield. With wilful destruction of this kind taking place in Victoria, it is not at all surprising that the Echidna has diminished in numbers during the last 15 years. In localities where this animal existed in fair numbers, some few years ago, it is now seldom seen, having been exterminated partly as a result of settlement, but generally, by vandals.—D.D.

Prof. F. S. Beattie, Dept. of Chemistry, Lowell Textile School, Lowell, Mass., U.S.A., in a letter to the Hon. Sec. of our Club, states that he would like to correspond with some member who is specially interested in botany, and exchange specimens of New England plants for Australian species. He will acknowledge promptly any letters that he receives.

THE ANTS OF VICTORIA

BY J. CLARK, F.L.S.

[PART III.]

In part II. of this series, the habits of the Bull-dog Ants were mentioned. Although not complete, the information given is practically all that is at present known concerning these primitive ants. Most of the species have somewhat similar habits.

To illustrate the various forms, a plate has been included, showing workers, females, and a male. The figures are slightly under natural size, but are all on the same scale. Figure 6 is a male, showing the small head and mandibles, also the long, straight antennae. The male retains the wings attached throughout his short life, which generally terminates with the nuptial flight.

Figure 4 is a normal winged female. After the nuptial flight, the female removes her wings, which are easily detachable, using legs and mandibles for the purpose. It may be noted that, in many cases, a nest will contain members of one sex only, while in others, one sex will far outnumber the other; in a few instances, males and females will be found in almost equal numbers. No doubt this is a provision of nature to prevent the deterioration of the species by inbreeding among the members of the same colony.

With her wings removed, the female appears as in figure 3, which depicts a normal queen found in the nest. Here the large scutellum and small mesonotum are seen. The worker does not possess a scutellum, but the mesonotum is large. Figure 8 represents an ergatoid female; that is, a worker in which the scutellum and other segments are partly developed, but which bears no wings. This form of female usually is larger than the worker, but rarely so large as the true female. The exact position of this form in the colony is at present unknown.

The photograph of *Myrmecia nigriceps* Mayr, a species that was dealt with in part II., is here included to illustrate a side view of the ant, showing the normal position as in life. The ant is enlarged $2\frac{1}{2}$ times. This illustration is typical of all the species of the genus. The long, powerful sting is to be seen at the apex of the gaster. This is the painful end of the ant. The large jaws cause little or no pain to the victim; they have only sufficient power to enable the ant to cling in order that she may drive her sting into the victim. The sting of the ant is not barbed, and is not left in the victim, as is the case with

the honey-bee: The ant can use her sting repeatedly, and appears to take great delight in doing so.

13. *MYRMECIA TARSATA*, Smith. (Pl. III., figs. 2 and 8). Millgrove (F. E. Wilson).

Smith, Cat. Hymn. Brit. Mus., 6, p. 145, 1858;
Roger, Berl. Entom. Zeitschr., 5, p. 53, 1861;
Mayr, Verh. Zool-bot. Ges. Wien., 12, p. 726,
1862; Forel, Fauna Sudwest Aust. I, p. 265,
1907; Froggatt, Agric. Gaz., N.S. Wales, pp.
5 and 10, 1905.

The worker is 19-22 mm. in length, and rather slender. Colour, black, or blackish brown; the mandibles; labrum, antennae, tarsi and the apical segments of the gaster, reddish yellow; postpetiole and gaster, black, with a slight bluish tinge, and smooth and shining.

The female is much larger than the worker, measuring over an inch in length. In colour and sculpture the sexes are very much alike. Figure 8 depicts an ergatoid female of this species, captured, with workers, by Mr. Wilson, at Millgrove.

This species does not appear to be common in Victoria. It was described as from N.S. Wales, and is abundant around Sydney. It occurs also in Queensland. Froggatt calls this the "Black Bull-dog Ant," and says that, "if one or two are captured the other ants retreat into the nest and do not show fight."

14. *MYRMECIA ANALIS*, Mayr. Portland (H. W. Davey).

Mayr, Verh. Zool-bot. Ges. Wien. 12, p. 725,
1862.

Myrmecia atriscapa, Crawley, Ann. Mag. Nat.
Hist. 9, vol. 16, p. 580, 1925.

The worker is 17-20 mm. in length. Head, thorax, and node light reddish, the head often slightly darker; scapes of the antennae, legs and postpetiole, lighter, more yellowish; mandibles and apex of the gaster, yellowish red; gaster, black, often with the base of the first segment reddish, particularly on the sides; basal two-thirds of the scapes, brown, or blackish.

The female is similar to the worker, but larger. The apex of the gaster is darker, more reddish.

Originally described by Mayr as from Neu Holland, this species has a wide distribution in Southern Australia. It ranges from Bunbury, W.A., to Brisbane, Q. I have frequently found this species nesting in decayed logs and grass-trees (*Xanthorrhoea*). The colonies

usually contain about 200 individuals. They are pugnacious, and will generally follow an intruder for some distance. They readily drop from trees on to a person passing close by.

15. *MYRMECIA LUCIDA*, Forel. Cheltenham (C. Barrett, L.B. Thorn). Ferntree Gully (F. P. Spry).

Forel, Ann. Soc. Ent. Belg. 37, p. 458, 1893.

Myrmecia regularis, Crawley, Ann. Mag. Nat. Hist. 9, vol. 16, p. 579, 1925.

The worker is 17-20 mm. in length. Shining brownish red; scapes and legs, darker, more brownish; mandibles, ranging from red to brown, in some species; caster, black with the apical segments castaneus.

The female is much larger than the worker, but otherwise similar.

The male is castaneus in colour, excepting the mandibles and antennae, which are slightly darker.

This species was originally described from Tasmania. It is found in various parts of Victoria and Western Australia. The ant faunas of these three States have much in common; this applies particularly to the ancient and primitive forms.

16. *MYRMECIA FORFICATA*, Fabr. (Pl. III. figs. 3 and 7). Widely distributed throughout the State.

Fabr., Mant. Insect. 1, p. 310, 1787. Smith, Cat.

Hymn. Brit. Mus. 6, p. 143, 1858; Mayr,

Verh. Zool.-bot. Ges. Wien. 12, p. 726, 1862.

Forel, Fauna Sudwest Aust. 1, p. 265, 1907.

The worker is 19 to 23 mm. in length. Brownish red; mandibles, clypeus and sometimes the front of the face, lighter red; gaster, black and shining, clothed with long, yellowish hairs, which are longer and more abundant on the apical segments.

The female is considerably larger than the worker, but does not differ in colour. Ergatoid females often are found in the nests of this species. They differ from the normal females only in not having the wing sclerites properly developed.

The male is slightly smaller than the worker. The head, thorax and gaster are black; mandibles, antennae, node, postpetiole, and legs, reddish, or sometimes brownish.

This is the commonest species in South-eastern Australia; but has not been found in W. Australia. It was one of the first species described from the collection made by Banks, in Tasmania.

This appears to be one of the species that were kept in artificial nests by E. E. Barker, and described by him in the *Victorian Naturalist*, 1903.

17. *MYRMECIA FORFICATA*, Fab. var. *BREVINODA*, Forel. Bendigo (L. B. Thorn), Gisborne (W. W. Froggatt, Type locality).

Forel, *Rev. Suisse Zool.* 18, p. 2, 1910.

This form is very much like *forficata*, differing only in having the node shorter. It is slightly smaller, but the colour, sculpture and pilosity are similar.

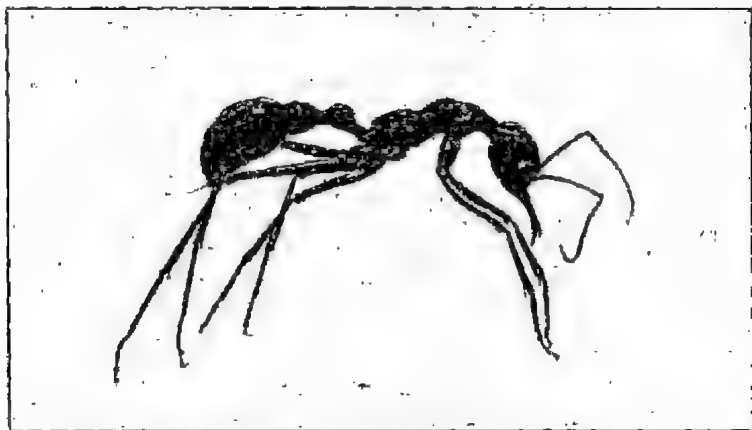


Photo. J. Clark.

MYRMECIA NIGRICEPS, Mayr.
Lateral view of worker (x. 2½).

18. *MYRMECIA RUBRA*, Forel. (Pl. III., figs. 1 and 9.) Yarra District (W. W. Froggatt, Type locality); Ferntree Gully (F. P. Spry); Belgrave (F. E. Wilson); Croydon (J. A. Kershaw); Cheltenham (C. Barrett and L. B. Thorn).

Myrmecia forficata, Fab. var. *rubra*, Forel. *Rev. Suisse Zool.* 18 p. 3, 1910.

Worker 19-23 mm. Dark red, almost blood-red, the gaster black and shining; mandibles and apical joints of the antennae, lighter in colour, the scapes tinged with brown; yellowish hairs on the gaster are short, and not abundant.

The female, in colour identical, is very slightly larger than the worker, but is more robust in form.

Forel described this species as a variety of *forficata*. It is, however, quite distinct from that species. The

females are even more widely separated than the workers.

19. *MYRMECIA PYRIFORMIS*, Smith (Pl. III., figs. 4-6).
Ferntree Gully (F. P. Spry).

Smith, Cat. Hymn. Brit. Mus. 6, p. 148, 1858,
pl. 10, f. 1-6; Mayr. Verh. Zool.-bot. Ges.
Wien. 12, p. 726, 1862; Froggatt, Cat. Aust.
Ants, Agric. Gaz., N.S. Wales, p. 10, 1905;
Emery, Gen. Insect. 118, p. 21, 1911.

Myrmecia forficata, Fab. r. *pyriformis*, Smith;
Forel, Rev. Suisse Zool. 18, p. 2, 1910.

This species is much darker and larger than *forficata*. The head is nearly square, whereas, the head of *forficata* is much narrower behind than in front. The gaster is more or less covered with a dense greyish pubescence, not shining, as in *forficata*.

The female is much larger than the worker, but similar in colour and sculpture.

The male is as large as the worker, and is black, with brownish mandibles and antennae.

This species is generally called the Black Bull-ant, but the term is also applied to all the dark species.

20. *MYRMECIA SIMILLIMA*, Smith, var. *VIOLACEA*, Forel.
Millgrove (F. E. Wilson), Woori Yallock (L. B. Thorn).

Myrmecia forficata, r. *simillima*, var. *violacea*,
Forel. Arkiv. for Zool. 9, 16, p. 5, 1915.

This form is very close to *simillima*, which it closely resembles in all but colour. The sculpture is almost identical. The head and thorax are reddish brown, generally with a slight metallic tint; gaster, black with a violet sheen; node and postpetiole, with a more greenish sheen; mandibles darker in colour than those of *simillima*, but similar in formation.

Some new species still remain to be added to the Victorian list. Several undetermined males are available; but, as they could only be attached to the species with doubt, they have been excluded for the present.

Sub-genus *PROMYRMECIA*, Emery.

Genera Insectorum, 118, p. 19, 1911; Wheeler,
Biological Bulletin, Vol. XLII., 4, 1922.

Pristomyrmecia, Emery (in part) Gen. Insect.
118, p. 19, 1911.

Halmanyrmecia, Wheeler (in part) Biol. Bull.
XLII., 4, 1922.

I include all the Jumping Bull-dog Ants in this sub-genus. They form a natural section, Saltatoria, of the genus *Myrmecia*.

These ants are readily distinguished from the *Gresoria* by their smaller size and more robust form. The mandibles are shorter and the scapes rarely reach to the occipital border of the head. The node is always short and broad, with a very short petiole in front. The femur of the hind leg is slightly thickened near the base; the legs are well adapted for jumping. The formation of the mandibles is variable, but a study of these greatly assists in grouping the species.

All the species are more or less highly coloured. A few, however, are quite black, with little or no variation. Others have the gaster densely clothed with bright golden pubescence, giving the ant a handsome appearance, black and gold.

The jumping habit of these ants is very difficult to account for. Apparently, in their present habits or mode of life, they do not differ from the non-jumping section. It is, however, only when they are disturbed, or excited, that they do leap; at other times they walk, in the manner of the large non-jumpers. The habits of ants of both sections are similar. During the bright sunny hours they hunt on trees and shrubs in flower. All the members of the sub-genus are most active in the late afternoon, from about four o'clock until sundown, when they retire for the night. They come out in the morning as soon as the sun is high.

Nesting habits do not differ greatly in the two groups. A few species of jumpers construct nests similar to, but smaller than, those made by non-jumpers. All the members nest in the ground, usually deep down, the depth ranging from 18 inches to 2 feet, rarely more. Some species construct their nest under stones or logs, but others prefer the open spaces, with no covering stone or log. *Promyrmecia picta* very rarely has any cover. The nest is deep underground, and its existence is indicated only by the small holes forming the entrance, or exit. A typical nest closely examined was two feet square, and had five entrances, each just large enough to admit one ant at a time. This nest, as is usual, was constructed near the base of a tree. The ground was strewn with fallen bark. Another nest was constructed at the side of a foot-track through the bush; all the entrances being protected by small plants. This is rather unusual with the species.

A few species of jumpers seem to prefer to make their nests in Termites' mounds; some species being found mainly in such situations.

Like the non-jumpers, the ants will always show fight when the nest is approached. They rush out from all the exits. Their sight is very keen; they come straight at the intruder, even when he is several feet away from the nest. They will also follow one for a considerable distance.

The jumpers are widely distributed throughout Australia, but are more abundant in the South than in the North. One species, belonging to this sub-genus, has been described from New Caledonia. This is the only Bull-dog Ant found outside of the Commonwealth of Australia.

Ten species are known in this State; many of these are also found elsewhere.

21. MYRMECIA (PROMYRMECIA) ABERRANS, Forel.

Myrmecia aberrans, Forel, Ann. Soc. Ent. Belg. 44, p. 54, 1900. Rev. Suisse Zool. 18, p. 9, 1910. Froggatt, Agric. Gaz. N.S.W., p. 8, 1905.

Myrmecia (Promyrmecia) aberrans, Forel, Emery, Gen. Insect. 118, p. 19, pl. 1, fig. 10, 1911.

The worker is 10 to 15 mm. in length. Black, the head, parts of the thorax, and the node, red; mandibles and labrum, yellowish red. The mandibles are short, and broad; the scapes do not reach the back of the head.

This is a very rare ant; so far only odd specimens have been obtained—by the late Mr. F. P. Spry, and by Mr. C. Oke, at Broadmeadows and Coburg.

22. MYRMECIA (PROMYRMECIA) PICTA, Smit. Sea Lake and Maldon (J. C. Goudie); Lake Hattah (J. E. Dixon).

Smith, Cat. Hymn. Brit. Mus. 6, p. 146, 1858. Lowne, The Entomologist, London, 2, p. 336, 1865; Mayr, Jour. Mus. Godeff. Mayr, Verh. Zool-bot. Ges. Wien. 12, p. 727, 1862.

Length of the worker, 9 to 12 mm. This species is most variable in colour, generally black, more or less marked with red. Some examples are wholly black; others, red. The mandibles, clypeus and front of the face are, however, always yellow. The antennae and front legs are reddish yellow; middle and hind legs more brownish.

The female is larger than the worker, but similar in colour and sculpture. Ergatoid females often are found

in the nests of this species; and I have frequently found several active females in the nests. It is very unusual to find more than one female in a nest of any species of this genus.

The male is as large as the worker; black, with the mandibles, front of the face, and whole of the legs yellow.

For more than fifty years this species has been confounded with another species, *urens* Lowne, which it somewhat resembles. Apparently it had not been seen since Smith described it, from Adelaide, in 1858. It is an inland species, not ranging on the coast. On the other hand, *urens* is a coastal species, not found inland. The two species are not connected, although both have a somewhat similar range of colour varieties. Forel has described two varieties of *picta*; these, however, should be attached to *urens*, as Forel identified this species as *picta*. One of the varieties described, *nigra* Forel, is not a variety; it is the black form of the typical *urens* Lowne.

KEY TO PLATE III.

Fig. 1, *Myrmecia rubra*, Forel, female. Fig. 2, *M. tarsata*, Smith, worker. Fig. 3, *M. forficata*, Fabr., female. Fig. 4, *M. pyriformis*, Smith, female. Fig. 5, *M. pyriformis*, Smith, worker. Fig. 6, *M. pyriformis*, Smith, male. Fig. 7, *M. forficata*, Fabr., worker. Fig. 8, *M. tarsata*, Smith, female. Fig. 9, *M. rubra*, Forel, worker.

NATURAL HISTORY EXHIBITION.

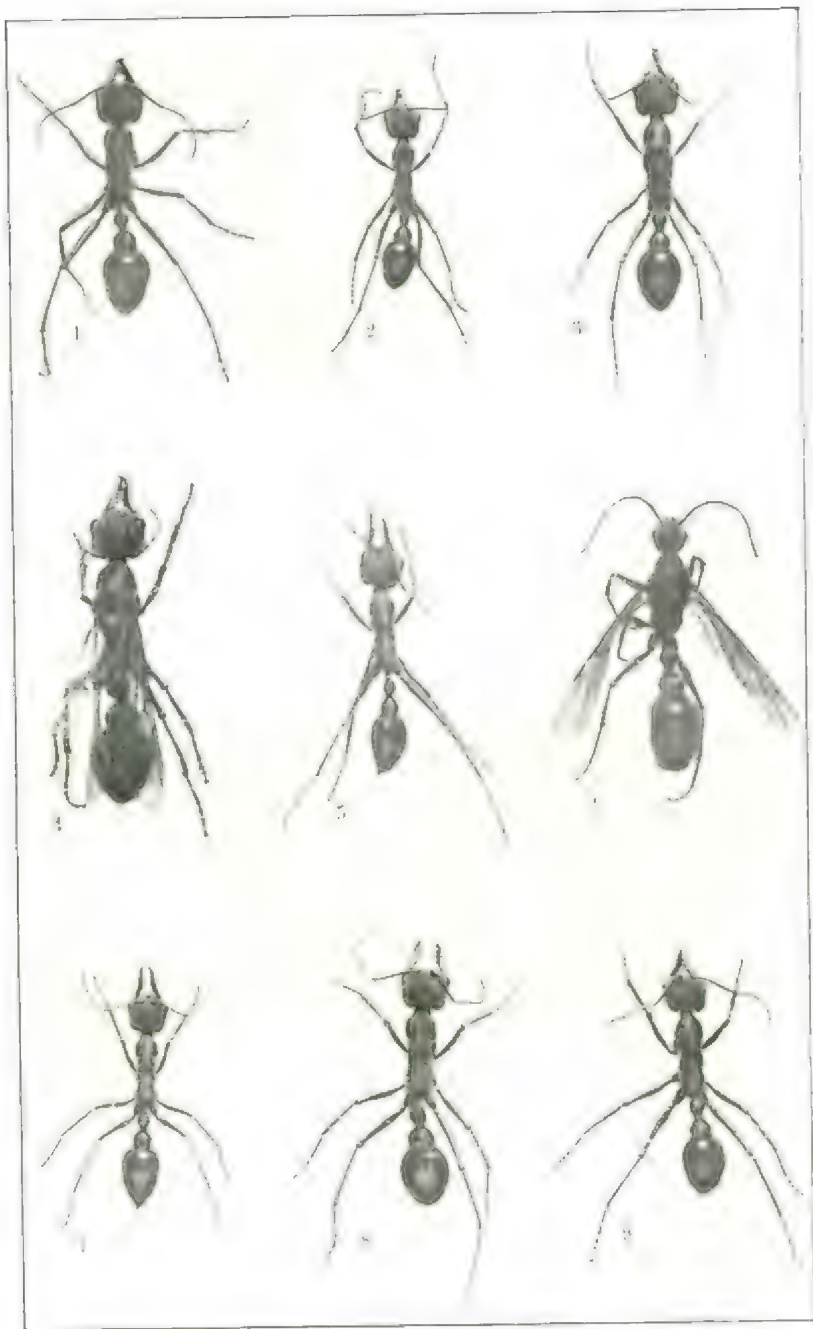
The Club's natural history exhibition will be held on July 20th, in the Independent Hall, Melbourne. All branches will be represented, it is hoped, from entomology to ethnology. Members of the Club have been appointed to organise the various sections; and already some fine exhibits have been promised. Tickets will be posted to members, who are asked by the committee to do all they can to assure the success of the exhibition.

A BIRD TRAGEDY.

When driving from Glenhompson to Moyston, some years ago, my attention was attracted to the extraordinary poise of a bird over a pool of water by the roadside. I stopped and watched, and found that the bird, a Pipit, *Anthus australis*, was perfectly motionless, with outspread wings, and with no apparent support. Closer examination showed that it was supported by a piece of fencing wire, against which it had flown and become impaled. The sharp iron had penetrated its chest at the neck, causing it to remain poised in the wonderfully life-like manner in which I found it, probably some weeks after the accident.—H. B. WILLIAMSON.

Correction.—The plates in May, 1927, issue of the *Naturalist*, should have been numbered I. and II. respectively, instead of xxii. and xxiii.

Plate III.



PTEROSTYLIS ACUMINATA, R. BROWN, AND
HYBRIDS.

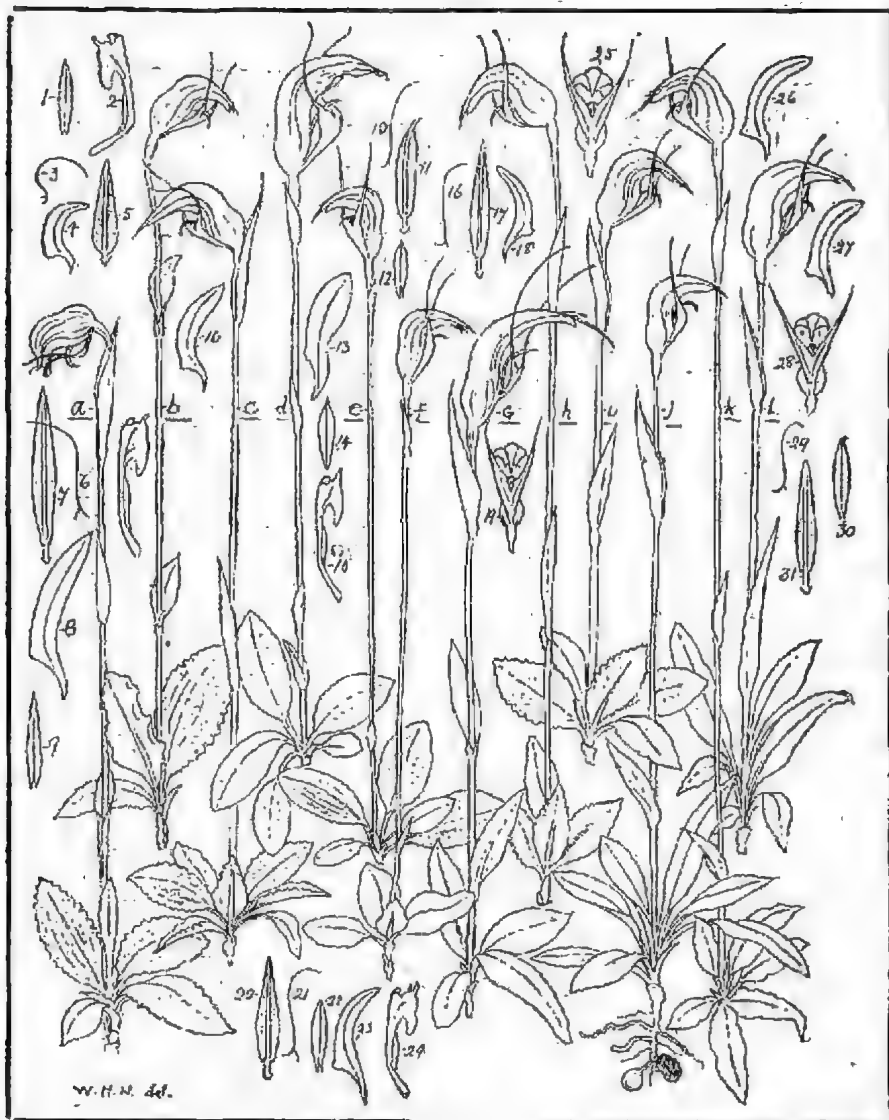
By W. H. NICHOLLS.

The form of *Pt. acuminata* found in New South Wales and Queensland, where it is fairly common, is readily recognised as the type (Figs. e and f) of this Greenhood orchid. Doubtless the original specimens—from which Robert Brown described the species—were collected in the former State. This form blooms during the autumn months. During the last few years, I have collected, or have received from others, interesting specimens, variously considered, either as hybrids, or as *Pt. falcata*, *Pt. acuminata*, or *Pt. furcata*.

These came from districts either in Victoria or Tasmania.

I have also received from the Paterson district, N.S.W., excellent examples of the type form. Particulars of all these specimens are included with the line drawings accompanying these notes. A survey of these specimens is of interest, and one cannot fail to notice certain characteristic features of two well-known species, viz., *Pt. falcata*, Rogers, and *Pt. Nutans*, R. Brown. The variations in the individual specimens, and the general outward dissimilarity of all from the accepted type of *acuminata* is clearly shown. We must admit them to be hybrids—puzzling intermediates; showing every possible variation between the parents; which, according to the evidence, are the above-mentioned species.

None of these specimens (with one exception) was collected far from the haunts of these two species; in fact, the majority of them were growing in company of either *falcata* or *nutans* (or both). The exception (Fig. k) has an interesting history. Several years ago, I received from the Tallangatta Valley (Vic.) plant specimens of two very rare species of *chiloglottis*. A fair quantity of soil accompanied these plants, which were accommodated in a large fern-pot. A few months later, a small, ovate-shaped leaf was noticed protruding through the soil. I removed the possible seedling to a smaller pot, for observation. A year later, it had three much larger leaves. In the following season the plant had progressed sufficiently to develop a bud; two months later (Dec.) it had developed into the fine specimen illustrated.



Greenhood Orchids and Hybrids.

It must be remembered that new forms are continually being evolved, and the ill-fitted intermediates die out. It is possible that some of the forms illustrated here will never be found again. On the other hand, should any of them persist, would it be advisable to add more names to our list? I think not; if we examine the internal structure (labellum and column) of these hybrids, we find that these organs agree respectively with each other; and, for all practical purposes, with those of the type form, they are almost identical. Generally speaking, in all the recognised species of *pterostylis* (to mention but one genus), we find that it is the labellum that varies the most; any important variation in this organ is regarded as of paramount significance.

It is possible that the ancestors of the type were *Pt. nutans* and *Pt. falcata*, or some other Greenhood somewhat like the *falcate* species. Possibly *Pt. Baptistii*, Fitz.; who can disprove it? The similarity of this fine species to *Pt. acuminata* has been noted by others also.

Pt. Toveyana, Ewart and Sharman, is still in a transitional stage. We have found interesting intermediates here also. Intermediates are known in some other genera. For instance, in one other genus (*Chiloglottis*), unbroken chains have been collected, showing intermediates from one species to another.

Summary:—Collectively, we find a startling number of differences in the forms before us; individually, however, the variations are of little value, are trivial. To regard them as forms of either *Pt. nutans* or *Pt. falcata*, or any other species not mentioned here, is, to me, unsatisfactory. In my opinion, the only satisfactory way of dealing with these puzzling forms is to regard them as forms of the species which they resemble closely, viz., *Pt. acuminata*, R. Brown. The colouring of all the species mentioned in these notes is practically the same, *greenish* with *brown* markings, *Pt. Baptistii* having the brightest colouration, the markings being a *light reddish-brown*.

Key to Figures, P. 42.

(a) *Pt. nutans*, R.Br., Ringwood (Vic.), Oct. (W.H.N.); (1) stigma (2) column (3.5.) labellum (4) petal. (b) Hybrid, Bayswater (Vic.) (2 sp'ns), Nov. (A. B. Braine); details similar to those of (1) (note appendage above upper bract). (c) hybrid, Bayswater (Vic.), Oct. (3 sp'ns) (W.H.N.), growing with *Pt. falcata* and *Pt. nutans*; (16) petal; other details as those of (1) (d) *Pt. Baptistii* Fitz., Lake Macquarie (N.S.W.), Sept. (Miss

Rupp) (10.11) labellum (13) petal (14) stigma (15) column. (e) *Pt. acuminata*, R.Br., Sth. Moreton Bay (Qld.), July (Miss H. Geissmann); details as those of (f). (f) *Pt. acuminata*, R.Br., Paterson (N.S.W.), June (Rev. H. M. R. Rupp); (12) stigma (16.17) labellum (18) petal (19) front of flower. (g) *Pt. falcata*, Rogers, Warburton (Vic.), Dec. (W.H.N.); (5.7) labellum (8) petal (9) stigma. (h) Hybrid, Bayswater (Vic.), Sept. (A. B. Braine), growing with *Pt. falcata* and *Pt. nutans*; (25) front of flower (numerous); details as those of (i). (i) Hybrid, Mordialloc (Vic.), Aug. (A. J. Tadgell), several sp'ns growing with *Pt. nutans*; details as those of (i). (j) Hybrid, near Waratah (Tas.) (Archd. Atkinson), Nov., 3 sp'ns growing with *Pt. falcata*; leaves have entire margins, very similar to *Pt. falcata*'s but numerous; (27) petal (28) front of flower (29-31) labellum (30) stigma. (k) hybrid grown from seedling (?) Tallangatta (Vic.), Dec., leaves similar to (j); (26) petal; other details as those of (i). (l) hybrid, Bayswater, Oct. (W.H.N.), 1 sp'm; growing in a clump of *Pt. falcata* and near several *Pt. nutans* and *Pt. curta*; (20, 21) labellum (22) stigma (23) petal (24) column; leaves similar to (j); labella of (a, b, c, h, i, j, k, l) *pubescens*.

ANTIQUITY.

Antiquity, it has been finely said, may be used as a lantern to explore Futurity. In Australia, the antiquary and the archaeologist, have limited fields, unless they glean in those that some folks believe, are non-existent. We must follow faint little trails that may lead us to some highway, ending in a prehistoric field.

The first number of "Antiquity," a quarterly Review of Archaeology, published in England, has just reached Melbourne. Its aim is to "attempt to summarise and criticise the work of those who are recreating the past"; its field is the Earth; its "range in time a million years or so," its subject the human race. New Zealand is represented in this first issue—an article on Maori Hill-forts. Australia doubtless will not be overlooked; since our country may yet become as important to students of pre-historic man as are the other continents.

India has revealed a new civilisation, undreamed of by archaeologists. Sir John Marshall's discoveries, in the Punjab and Sind, described in the *Annual Report of the Archaeological Survey of India, 1923-4* (published in 1926), are not less remarkable than those made in Crete, long ago, by Schliemann; and, later, by Sir Arthur Evans: they resurrected the pre-historic age of Greece. The excavation of Indo-Sumerian sites in India, has revealed that the peoples of the Punjab and Sind, at least 5000 years ago, "were living in well-built cities, and were in possession of a relatively mature culture, with a high standard of art and craftsmanship, and a developed system of pictographic writing." Excavators in Australia may hope for no startling discoveries, of lost civilisations; they may hope to find relics of a pre-historic race, to continue the story of which, already, some pages have been written.—C.B.

COLOUR BANDS IN AN ANCIENT SHELL.

BY F. CHAPMAN, A.L.S.

Among the many startling things revealed to the student of fossils, not the least curious is occasional evidence of colour preserved over very long periods. When we say long periods, we do not refer to time in the human or ephemeral sense, but in the way that the geologist has inured himself to think, literally in millions of years.

When, however, the original colour is seen in its more or less perfect preservation, in a shell dating back for at least 50,000,000 years, as, for example, in the primitive ammonite shell, *Glyphioceras*, of the Carboniferous period, we may cease to wonder at the "fast" colour seen in the shell under notice.

The colour on this fossil, to which we now refer, is a real pigment-tinting, and not the resplendent pearly, or opaline colour seen in the inner layers of the pearl oyster, the mussel, and the pearly Nautilus. For this pearly character, which is also preserved for even much longer periods, is due to physical characters in the structure of the shell. The true colour of a shell is much more easily obliterated by chemical changes going on during and after preservation.

The subject of this note is a broken specimen of the curious nautilus-like shell, known to palaeontologists as *Aturia australis*. The species was named by Professor McCoy, in 1876, and it is, therefore, fitting that the present fossil should find an honoured place in the National Museum, where the Professor was Director and Palaeontologist. This unique specimen was found by one of the members of the Mornington Field Naturalists' Club, Miss Ivey Chitts, who gave it to the Museum.

In its perfect condition the shell would have been 5 inches across in its longer diameter, and what remains is a little less than one half of the original shell. It was obtained from the blue marl of the Balcombian beds, of Oligocene age, and is, therefore, at least three or four million years old.

The surface of the shell is distinctly marked with brown-pink colour-bands, reminding one of those seen in the living pearly Nautilus. The colour-bands have a strong backward sweep, corresponding to the growth lines of the shell, broadest in the middle, and narrowing

towards the periphery, and less so towards the umbilicus.

When this mollusc died, the marly ooze, with its "falling rain" of sea-butterflies, foraminifera, ostracoda, and radiolaria, must have settled down gently and completely, so as to coat the fossil in an impervious covering. Another fortuitous incident favouring the discovery of this important specimen, was the founding of the Mornington Field Naturalists' Club by the Rev. Geo. Cox, who is doing splendid work in encouraging the younger generation in field study.

MOUNT PIPER.

Locally known as the "Sugarloaf," Mount Piper stands out quite prominently in the landscape when approaching Broadford per train from Melbourne. A walk of two miles from Broadford brings us to the mount, which is only a few hundred feet in height. The climb is rough, but easy. A magnificent panoramic view is to be obtained from the top, the hills, mountains and plains being seen for many miles around.

The result of the drought was rather disastrous, and some interesting notes were made on a recent visit. Large clumps of the Rock Fern, *Cheilanthes tenuifolia*, covering quite a goodly area, were lifeless. I did not see one living plant on the mount. It is to be hoped that Nature has stored a stock of spores for future growth.

Many hundred plants of the Wiry Dock, *Rumex flexuosus*, were all dead. The long thick roots of many plants which I dug up were also killed by the drought. Unfortunately, these plants left a large supply of their seeds.

Quite a number of trees of the "Lightwood," *Acacia implexa*, as well as plants of the Common Heath, *Epacris impressa*, had been killed. Dead patches of the Prickly Starwort, *Stellaria pungens*, were common everywhere.

It was very depressing, for this is usually a most prolific mountain for beautiful native plants. I only found one poor little specimen of Parson's Bands, *Eriochilus autumnalis*, the sole representative of the orchid family.

I collected an interesting stone. It was a piece of glacial conglomerate, known as "Pudding Stone," which was quite a foreigner to the district. Mr. Brittlebank is of opinion that this piece came from the glacial area in the Werribee River, near Bacchus Marsh. It was surely carried to Mount Piper by the aborigines.—E. E. PESCOTT.

A TRIP TO BUSSELTON AND YALLINGHUP CAVE.

BY F. PITCHER and J. STICKLAND.

(Read before the Field Naturalists' Club of Victoria,
November 8th, 1926.)

During the meeting of the Australian Association for the Advancement of Science, in Perth, W.A., August and September, 1926, my wife and I, with Mr. Stickland, visited the Yallinghup Caves. On the journey, we were pleased by the sight of numerous wild-flowers, brightening the railway line, on either side. Among them were the crimson and green Kangaroo Paws, *Anigozanthus Manglesi*, with their tall flower-spikes, erect above *Leschenaultia biloba*, *Hoveas*, *Burchardias*, and orchids of different species.

At Serpentine, 34 miles from Perth, the Serpentine Falls were viewed, in early morning sunlight, from the carriage window. The water flows over rugged rocks, from a height of more than 100 feet. At North Dardalup station an immense quantity of jarrah timber was stacked. The brown and orange Kangaroo Paw, *Anigozanthus flavidus*, now mixed freely with *A. Manglesi*, and other flowers beside the railway line.

We had been passing grass trees or "Blackboys" (*Xanthorrhœa*) in thousands, in various localities for several miles, but comparatively few were yet flowering. A peculiar growth was noticed in the crown in some specimens. We learned that these were known as "Drumhead Blackboys," and their stems made good flooring for sheds, etc. They appeared to have several sheathed stems, 6 inches or 8 inches high, standing up from their crowns, among the leaves, with a flower-head several inches broad on top. Subsequently, I was told by Mr. Gardner, the assistant Government Botanist of the Agricultural Department in Perth, that these plants were the endemic *Kingia australis*.

From Pinjarrah, we travelled through flooded country, with, here and there, drier areas, thickly studded with *Macrozamia Fraseri*. Near Hamel Station we passed one of the Forest Nurseries of the State. *Pinus insignis* plants, close to the railway line, are marked "Planted in 1904." They were about 20 to 30 feet in height, and had stems of only 9 inches to 12 inches in girth. We now passed into more hilly and better country, where grazing and dairying seemed to be carried on, and reached Yarloop, the centre of a very busy district.

Large stocks of timber are brought to this, as well as to Wokalup station, 10 miles further on. The largest mass of jarrah timber that we had ever seen was at this latter place. Comfortable looking homes and country similar to parts of Gippsland, with sheep and cattle-looking in prime condition, were again seen, as we were reaching Benger station. Brunswick station is the junction for the Collie district, where the Collie coalfields are situated about 25 miles distant.

Further evidence of the severity of the floods was seen as we travelled over low-lying country. At Dardanup a small *Xanthorrhœa*, probably *X. gracilis*, was growing beside the line in large numbers. On the platform at another station were three of the finest Kurrajong trees we had ever seen. They were about 40 feet in height, and 24 inches to 30 inches in diameter at the base. Each tree had several stems, was well shaped, and of pyramidal form. Seed pods taken from these trees have been given to our Botanic Gardens. The trees are of the variety *occidentalis*, of *Brachychiton diversifolium*. Numerous large specimens of what appeared to be *Eucalyptus gomphocephala*, of *E. cornuta* and *E. calophylla*, were passed as we journeyed through Fregwell, Elgin and Capel districts. Near Ludlow further extensive *Pinus insignis* plantations, in splendid condition, exist running parallel and adjacent to the line for long distances.

Between Ludlow and Busselton we saw *Hardenbergia Comptoniana* more gloriously beautiful than we could have imagined. In addition to clothing the areas in large patches beside the railway line and mixing with Kangaroo Paws of different species and other beautiful flowers, the plants had sent their stems climbing into the prevailing forest trees of *Agonis* on either side of the line for about half a mile. Rich blue flowers flaked stems stretching from tree to tree at heights up to 20 feet.—F. PITCHER.

From Busselton, a small coastal town, we travelled by motor car, about 20 miles, to the Caves House, in a timbered glen. Near by is a picturesque outcrop of limestone. The abundance of orchids in this district was indicated by a large bunch gathered by some visitors who had been out for the day, and a spider orchid, *Caladenia*, sp., of large size, was well represented.

The following morning a pleasant walk of about half a mile down the creek valley brought us to the ocean beach.

Numerous sponges of extraordinary shapes and large size, very different from those to be collected near Melbourne, were noted. In the afternoon, we walked through the bush to the cave. Caves of the type visited occur in limestone formations, and are hollowed out by the action of water, and enlarged by the fall of masses from the roof and sides. In some cases the stream, presumably responsible for the excavation, continues to flow through the cave. Generally, however, the caves are comparatively dry.

Yallingup Cave is situated at about the northern end of a large limestone formation, running parallel to the coast, and extending from near Cape Naturaliste to Cape Leeuwin, honeycombed by caves for its whole length. Very few of these are available for inspection. The narrow and tortuous passages of the cave we inspected are well lit by electricity. Beautiful formations were seen on every hand. The walls of the various chambers are extensively covered by an alabaster-like layer of calcium carbonate, while from the "ceilings" hang innumerable stalactites of all sizes and shapes. Some of these resemble glass tubes, so frail as to be easily crushed by the hand. Some large groups are very beautiful.

All these formations are built up by the action of rain water from the surface of the ground above, which, charged with carbonic acid, percolates through the limestone, dissolving it and reaching the cave charged with carbonate of lime. The water drops so slowly that the calcium carbonate is re-deposited.

Perhaps the most beautiful formations are those known as shawls, or blankets, the latter being the more correct descriptive name. These extraordinary objects are suspended from the ceiling by their edges, and consist of tin sheets of calcium carbonate, perhaps a quarter of an inch thick, and varying in length up to 5 feet or more. They hang for a width of 18 or 20 inches. Their colour is exactly like that of a new blanket, the coloured stripes near the edge being represented with remarkable exactitude, together with the sewing along the very edge. A certain corrugation of the surface of some of these blankets suggests the idea of fancy weaving. These are found hanging from a sloping ceiling.

An astonishing feature of the blankets in this cave is their being folded, thus instead of hanging down as a single film, they are turned back at the ends and become double. Innumerable diminutive blankets hang from

the ceiling, and closely resemble rashers of bacon, by which name they are known.

Among the objects which set one wondering are the Mystery Formations. Beginning like ordinary stalactites, as a perpendicular pendant, they take a sudden turn to one side, and extend in a horizontal direction; then many of them turn upward. How water oozing down from above can cause this upward "growth" is a mystery.

In one of the Buchan caves a considerable cluster of tree roots has penetrated the rock and hangs from the ceiling. This is altogether outdone in the Yallingup Cave, for here a root about 3 inches in diameter, comes through the ceiling and passes through the floor. It is supple, and may be bent aside. When it is considered that the lowest part of the cave is 150 feet below the surface, the presence of such a root of such a size is most remarkable.

The "amphitheatre" is the crowning glory of the cave. It is a circular chamber, about 75 feet in diameter, and of similar height, with a domed ceiling, which is practically covered with large stalactites, while from the edge of every rocky ledge hangs a calcareous fringe.—J. STICKLAND.

TREES AT NEWHAVEN.

While at Newhaven, on the eastern end of Phillip Island, recently, on the property of the Church of England Boy's Home, I saw a number of magnificent specimens of the Scented Paper-Bark; *Melaleuca squarrosa*. They were the largest specimens I have ever seen. I measured several which were over eighteen inches in diameter three feet from the ground; a few were two feet through; while one that had been recently felled, measured two feet six inches in diameter. The trees were fully 30 feet in height.

These trees surely constitute a record, for it is usually considered that this is rather an undersized tree, of quite a small diameter.

It is pleasing to learn that this grove is to be preserved as a shelter paddock for stock.

The Sweet Bursaria, *Bursaria spinosa*, is very abundant at Newhaven, where it is commonly known as "Myrtle." The bushes are very vigorous, and very well clothed in foliage. Several local residents were loud in its praise, saying that the bushes flowered very freely, and were a source of great pleasure at New Year. I was very pleased to note that everybody was in favour of protecting the shrubs, one resident being very proud of having one plant inside the fence.

There were also some fine specimens of the Trec-violet, *Hymenanthem dentata*, which were already showing abundant buds for the spring flowering.

The soil at this end of the island is very rich and fertile, and this accounts for the excellent growth of the native trees.—E. E. PESCOFF.



THE FLAME-BREADED ROBIN.

In the "Australasian," January 15, 1927, Capt. S. A. White discusses the migration habits of some Australian birds, and includes the Flame-breasted Robin (*Petroica phoenicea*) as a migrant between Tasmania and the mainland. In Gould's time, and for fifty years afterwards, it was generally believed by ornithologists that these Robins crossed Bass Strait every spring to rear their broods in the highlands of Tasmania; however, in recent years it has become an established fact that Flame-breasted Robins, so plentiful in the open country in Victoria, during winter, retire into the mountains to nest. They have been observed in great numbers during the summer months.

In a monograph on this species (*Emu*, vol. 8), Mr. A. G. Campbell pointed out that it would be impossible for such weak fliers to cross the Strait in the season of storms. On the high ranges around Noojee, many of their nests have been found; while the birds are quite numerous throughout the spring and summer months. Nearer Melbourne, in the Dandenong ranges, especially around Olinda, many pairs have been seen nesting; one pair in three consecutive years, reared broods in a nest beneath a house raised a few feet above the ground. November seems to be the usual breeding month of this species. Nests generally are placed on ledges of embankments, or burnt tree-trunks.—D.D.

SHRIKE-TITS IN TOWN.

Among recent bird visitors to my garden, in Elsternwick, were three Eastern Shrike-tits, *Falcunculus frontatus*. I have seen this species, or heard its call, in city parks and gardens; have had glimpses of it in several suburbs; and conclude that it is not rare around Melbourne.

Shrike-tits like the tree tops, and so are seldom noticed, unless their notes betray them, being familiar sounds to the bird observer. The crested birds are "foreign-looking" to some folks, who might find it difficult to distinguish a Goldfinch from a New Holland Honey-eater. C.B.

EXCURSION TO TOOLANGI.

Toolangi has been twice previously visited by members of the Club, namely in 1910 and 1922. An account of the district, by Mr. F. G. A. Barnard, appears in the *Naturalist* for March, 1910. In the 17 years since then, saw-millers and bush-fires have changed the face of primitive nature considerably; but portions of the forest country, and several beautiful fern gullies, still remain unscathed.

Eight members of the Club assembled at "Heathlands," on April 14 last. The house is a genuine specimen of half-timbered work, a strong hardwood framework, with its spaces filled in with locally-made bricks. It stands in its own grounds (some 55 acres), and is set well back from the Yarra Glen-Road, while the Yea River, locally known as "The Muddy," runs at its rear. In the orchard at the back of the house many Crimson Parrots (*Platy-cercus elegans*) were disporting themselves, most of them being young birds. Another constant visitor to the apple and quince trees was a Pied Bell Magpie (*Strepera graculina*), while the musical calls of the Butcher Bird (*Cracticus torquatus*), and the Grey Shrike Thrush (*Colluricincla harmonica*) were often heard from the verandah.

Owing to the lateness of the season few native plants were in flower; but ferns were much in evidence, and any specialist in fungi might have secured a good selection. *Cardyrops Taylori*, a fungus that grows out of the hinder end of the caterpillar of the Swift Moth, is described by Dr. J. A. Leach, in *Australian Nature Studies*, as a "beneficent" fungi. Such a term in Nature's processes is merely relative, and probably the caterpillar is of a different opinion.

Altogether, 130 species of plants were noted, including 23 varieties of ferns. Only 31 plants were found in flower, among which *Correa lawrenceana*, locally known as "tangle-foot," was prominent. Great masses of Coral Fern, *Gleichenia laevigata* and *G. circinata*, growing along the banks of the Yea River, and the smaller streams, were especially beautiful.

We visited most of the places previously explored by members of the Club, in earlier visits, such as The Sylvia and Smedley Falls, and what is known as "The Canoe"; but also broke fresh ground in visiting two fern gullies, "Cooper's" and "Nolan's." Cooper's Gully, through which the Chum Creek runs, suffered somewhat from last year's fires, and we noted here the luxuriant growth of the Giant Mountain Grass, *Glyceria dives* F. v. M., which was, in places, fully 10 ft. high. A shrub that seemed to be doing well in this gully was the Elderberry *Panax*, *Tieghemopanax sambucifolius*.

Nolan's Gully, which is reached by the old hardwood timber mills track, at the back of Beach's saw mill, is one of the most beautiful gullies to be found within easy distance of Melbourne. We traversed the forest, following the old tram-track for miles, pausing every now and then to listen to the calls of Lyre Birds, or the wailing cries of the Black Cockatoo. Some of the Mountain Ash trees we passed were very fine specimens. Indeed, one fallen giant, our guide declared, was 300 ft. in length. In the gully itself the tree-ferns were of exceptional girth and height, and their branching fronds overhead shut out the sunlight. Many of the tree-fern trunks were clothed with most beautiful mosses, while others were scarred with initials, which some previous visitors had cut upon them, thus desecrating one of Nature's sanctuaries.

Two things one would like to bring under the notice of the local Progress Association: the tracks, especially those to Sylvia Falls, and Nolan's Gully, require attention, and a rough sketch map of the district, showing the points of interest and the tracks leading thereto, is needed. At present, it is an easy matter to lose one's way.—A.E.K.

The Victorian Naturalist

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No. 523.

FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall, Victoria-street, on Monday, June 13th, 1927. The President, Mr. E. E. Pescott, occupied the chair, and about 100 members and visitors were present.

CORRESPONDENCE.

From Department of Lands and Survey, stating that the reservation of 3,586 acres at Sperm Whale Head, as a site for a National Park, was notified in the Government Gazette of May 4th last.

REPORTS.

Reports of excursions were given as follow:—Geological Museum, Mr. A. E. Rodda; Ringwood to Mitcham, Mr. G. Coghill.

ELECTION OF MEMBERS.

The following were elected as ordinary members:—Miss A. H. Moors, 14 Vincent-street, Malvern; Dr. Chas. P. Alexander, Massachusetts Agricultural College, Amherst, Mass., U.S.A.; and as a Country member: Mr. Herbert J. Prentice, Forestry Department, Orbost.

ANNUAL REPORT AND BALANCE-SHEET.

The Annual Report for the year ended April 30th, 1927, was read by the Hon. Secretary, who moved its adoption. The motion was seconded by Mr. A. G. Hooke, and carried unanimously.

The Hon. Treasurer submitted the Balance-sheet and financial statement for the year, and moved their adoption. Mr. G. Coghill seconded the motion, which was carried unanimously.

ELECTION OF OFFICE-BEARERS AND COMMITTEE.

The President referred to the fact that the whole of the retiring office-bearers and members of the Committee were unopposed, which he considered an unique event in the Club's history. It indicated the complete satisfaction and confidence of members in the various officers and Committeemen. He had much pleasure in duly declaring them re-elected for the ensuing year.

VISITORS.

The President welcomed Mr. Robert Hall, of Tasmania, Rev. W. Tippet, President of Geelong Field

Naturalists' Club, and Mr. R. D. Elliott, Acting Chairman of the National Museum Committee. Each of these gentlemen briefly responded, Mr. Hall recalling his early association with the Club, while Mr. Elliott referred to the assistance which he hoped to receive from members of the Club towards popularising the National Museum.

GENERAL.

Mr. C. Barrett moved: "That the Chief Secretary be written to urging him to veto the proposal that an open season be declared for the trapping of opossums." Mr. A. G. Hooke seconded the motion, which, after a short discussion, was carried without a dissentient.

The President referred to the proposed planting of evergreen and deciduous trees along the Geelong road, and stressed the importance of the planting of this road being confined to Australian evergreens. Mr. G. Coghill moved: "That the Club requests the Country Roads Board to make the Geelong Road a distinctively Australian avenue, by planting it exclusively with native evergreen trees." Mr. D. Dickison seconded the motion, which was carried unanimously.

The President announced that an anonymous donation had been made to the Club for the purpose of financing a natural history expedition to parts of Victoria which have not yet been thoroughly investigated, and of publishing the results thereof; all the material collected to be presented to the National Museum and the National Herbarium. Mr. C. Barrett moved: "That the grateful thanks and appreciation of the members of the Club be conveyed to the donor through Mr. R. D. Elliott, together with an intimation that the Club accepted the donation under the terms laid down." Mr. F. Pitcher seconded the motion, which was carried.

PRESIDENTIAL ADDRESS.

The President delivered the Presidential Address, in the course of which he made a strong appeal to the younger members of the Club to specialise in some of the many fields of natural history, in order to carry on the splendid work achieved by the older members. Mr. Pescott then exhibited a very fine series of lantern slides in natural colour, depicting many of the wildflowers of Western Australia observed during his visit to that State last year.

EXHIBITS.

By Mr. G. Coghill: Cultivated specimen of *Grevillea rosmarinifolia* A. Cunn. (also dried fruits of the plant

from Western Australia) ; Flame Heath, *Astroloma conostephioides*, F. v. M., and Desert Banksia, *B. ornata* F. v. M., from near the South Australian border.

By Mr. E. E. Pescott, F.L.S.: Cultivated specimen of Bushy Heath-Myrtle, *Thryptomene calycina* (F. v. M. Stapf; sample of sand plain soil, from Western Australia.

By Mr. F. Pitcher: Flower-heads of the Drumhead Blackboy, *Kingia australis* R.Br., from Harvey, Western Australia, the only species of the Genus *Kingia*, Family *Juncaceae*.

By Mr. W. H. Roger: Specimens of Caterpillar-fungus *Cordyceps Taylora*, obtained at Toolangi, April, 1927.

By Miss G. Nokes: Cultivated specimens of *Hakea laurina*, a Western Australia species.

By Mr. C. Borch: Case of Swallowtails, *Papilio egipeus*, from Cairns district, Q., showing the great difference between the colouring of the sexes.

By Mr. C. French, jr.: Cabinet drawer of 28 species of insect pests of street trees.

By Mr. H. B. Williamson, F.L.S.: Dried specimens of plants new to Victoria: *Swainsona Morrisiana* J. M. Black, collected at Chiltern by the exhibitor, Dec., 1897, and at Pimpinio (Wimmera), by Mr. D. McLachlan, and sent to exhibitor, Aug., 1904. Determined by Mr. Black, who recently described the species from South Australian specimens. *Ruelingia prostrata* Maiden and Betcher, Creeping Kerrawang, collected at Monkey Creek, South Gippsland, by Miss Erica Barton, and sent to exhibitor Nov., 1926.

PIONEER NATURE PHOTOGRAPHER.

Claude P. Kinane, who died on June 14 last, from injuries received in a motor car accident, was one of the first nature lovers in Australia to realise the importance of the camera in field work. His photographs of birds at their nests, and of fledglings in their nurseries or just out in the world, were novelties, about twenty years ago. He obtained an unique series of photographs, illustrating the early life of an Australian cuckoo.

Always keenly interested in wild nature and the open air, Claude Kinane, first as a dairy farmer, and later as an orchardist, had opportunities for observing birds that he did not neglect. But for some years prior to his death he lacked the leisure necessary for nature photography. His name will always be associated with the pioneer period of a hobby that has become of scientific importance. He helped to popularise nature study, and was helpful to many who followed in his steps, bird hunting with field glass and camera.—C.B.

ANNUAL REPORT.

To the members of the Field Naturalists' Club of Victoria.
Ladies and Gentlemen,—

Your Committee has much pleasure in presenting for your consideration the forty-seventh annual report, dealing with the activities of the Club for the year ended April 30th, 1927, and it affords them much gratification to report that the Club has passed through a very successful year, with encouraging prospects of a continuance of this satisfactory position.

During the term under review, the membership has shown a large increase, 82 new members having been enrolled (60 ordinary, 14 country, and eight associate members), while 16 names have been removed on account of deaths, resignations, and other causes, leaving a net increase of 66 for the year. The total membership is now 320, comprising two honorary, eight life, 233 ordinary, 62 country, and 15 associate members.

The deaths of Messrs. G. A. Kearland and F. Wisewould during the year are deeply regretted. Both gentlemen were old and valued members of the Club. Mr. Kearland's membership extended over a period of 40 years. He was a noted ornithologist and performed much valuable work as a member of the Horn Expedition to Central Australia in 1894, and the ill-fated Calvert Expedition to North-west Australia in 1896. He was President in 1907-8 and 1908-9, and acted on the Committee of Management for many years. The Club has sustained a great loss in his death. Mr. Wisewould was an "original" member of the Club, and occupied the office of President in 1910-11 and 1911-12, in addition to other positions on the Committee, over a period of 16 years. He was a keen and enthusiastic worker, especially at the annual wildflower shows. His genial personality and kindly disposition endeared him to all with whom he came in contact, and his passing hence leaves a void difficult to fill.

The monthly meetings have been held regularly, and large attendances have been attracted. The policy of the Committee in providing for papers and lectures of a more popular nature has been justified by the increased interest of members and the public. On several occasions more than 100 persons have been accommodated at our meetings. A number of papers and lectürettes, dealing with various branches of natural history, were contributed during the year by Messrs. A. D. Hardy, J. A.

Ross, E. E. Pescott, F.L.S., C. Barrett, C.M.Z.S., W. H. Nicholls, L. L. Hodgson, A. E. Rodda, C. Daley, B.A., F.L.S., F. Pitcher, T. Tregellas, Rev. Lang, A. S. Kenyon, J. Searle, J. A. Kershaw, H. W. Davey, F.E.S., and F. Lewis (Chief Inspector of Fisheries and Game Department). The subjects dealt with were diversified: Pond-life, two, Birds, two, Reptiles, two, Fish and Anthropology, one each; six related to Botany, and four to subjects of a general nature. The great majority of the papers and lectures have been illustrated with lantern slides, thus adding considerably to their interest.

The forty-third volume of the "Victorian Naturalist" has been completed, and the thanks of the Club are due to Mr. Chas. Barrett, the editor; for the large amount of valuable work which he has devoted to the publication of the journal, and the high standard that has been maintained. In addition to many interesting short articles and papers by various authors, a valuable series of articles on Victorian Ferns by Mr. H. B. Williamson, F.L.S., was published in the journal, and a number of reprints thereof were made available by Mr. Williamson for disposal by the Club; they found a ready sale among members. Mr. E. E. Pescott's fine series of articles describing the Orchids of Victoria was also published in the "Naturalist," the last instalment appearing in the May issue. These contributions form valuable and convenient references for students of the particular subjects dealt with. Members are urged to assist the editor by submitting for publication articles on any branch of natural history with which they are familiar, and by contributing notes on various aspects of nature which may come under their notice, for the "Field and Study" section of the journal.

A comprehensive syllabus of excursions was drawn up early in the year, and members have largely availed themselves of the opportunities afforded for field work under the various leaders. Half-day visits were made to numerous places in and around the metropolis, and full-day trips were undertaken to Sherbrooke Gully, Mornington, Geelong, Hurstbridge, Tooradin, Healesville, Millgrove, Yan Yean, Killara, Belgrave, Cockatoo and Macedon. More extended excursions included a Christmas "camp-out" at the Mitchell Gorge under the leadership of Mr. C. Daley, B.A., F.L.S., a week-end at East Warburton, and a five-day visit to Toolangi. At several of the more distant places visited, a native tree, made avail-

able through Mr. P. R. H. St. John by the Director of the Botanic Gardens, was planted in commemoration of the Club's visit.

The annual Exhibition of Wildflowers was held in the St. Kilda Town Hall on Tuesday, October 5th, and was opened by the President (Mr. E. E. Pescott, F.L.S.), in the absence of His Excellency the Governor (Lord Somers) through illness. General opinion pronounced the display to be one of the finest and most successful of the series held by the Club, this satisfactory result being largely due to the splendid supplies of flowers forwarded by members and friends in the country districts and neighbouring States, and to the valuable and enthusiastic work performed by a number of capable helpers. A net profit of £129/7/1 resulted, of which amount the sum of £25 was donated to the Children's Hospital Appeal. In appreciation of this donation, the Hospital Committee invited the Club to nominate a Life Governor, and Mrs. V. H. Miller was nominated for this position.

In June last, on the suggestion of Mrs. E. Coleman, an Orchid Section was formed, membership being restricted to members of this Club, but other persons interested in the subject being welcomed as visitors to the meetings. Several meetings have been held at the National Herbarium kindly placed at the disposal of the Orchid Section by the Government Botanist, and various matters relating to the nomenclature of species of the orchidaceæ discussed and recommendations made in regard thereto.

Your Committee has much gratification in reporting that the efforts of the Club to have a large area of Crown Lands situate at Sperm Whale Head, in the Gippsland Lakes, declared a National Park, have met with success; an area of 3,586 acres having been declared a sanctuary some months ago, and the proclamation of this area as a National Park has recently been gazetted.

The Club has also been largely responsible for the declaration of the Sherbrooke Gully and Forest as a sanctuary for native fauna. A conference was held in March last to discuss the proposal to have this area proclaimed a National Park, but, in view of the fact that it was already under the control of the Forestry Commission, it was decided to form a deputation of representatives of the various societies interested, to interview the Forestry Commissioners, in order to urge stricter supervision for

the prevention of destruction, and the preservation of the area in its natural condition. In response to the requests made by this deputation, the Commissioners promised to discontinue the planting of coniferous and exotic trees, and to see that every care was exercised to maintain the area in as natural a state as possible. They further agreed to appoint a number of honorary forest officers to be nominated by the various societies represented on the deputation. Mr. E. E. Pescott, F.L.S., has accordingly been nominated as the representative of this Club.

It is a matter for regret that our Library, which contains so much valuable and interesting matter, is not made use of more freely by members, and the hope may at the same time be expressed that some of those who do use it and have retained volumes or parts for an undue length of time, will return them without further delay in order that a stock-taking can be made. In addition to publications ordinarily received by the Club in exchange, are four others, of which the *Bulletins of the Dominions' Museum*, New Zealand, and the *Records of the South Australian Museum*, may be mentioned.

Some 15 volumes were acquired during the year, most of them by donation, from the Clarendon Press, the Oxford University Press, and various members. Notable additions were Le Soeuf and Burrell's "*Wild Animals of Australasia*"; Burrell's "*The Platypus*," and the third part of Black's "*Flora of South Australia*." The Club is specially indebted to Mr. T. G. Sloane, who kindly presented a copy of Dr. Tillyard's volume "*Insects of Australia and New Zealand*," to the Library, and also to Mr. A. E. Keep, who generously donated two valuable botanical works ("*The Ferns*," Vol. II., by Professor F. O. Bower, and "*The Classification of Flowering Plants*," Vol. II., by Dr. A. B. Rendle), to this department. Donations of books dealing with any branch of natural history are at all times welcomed and appreciated by the Committee and members.

Careful consideration has been given to the Rules of the Club, and, in order to bring them up to date, several suggested alterations and additions were submitted to members at the April meeting. These recommendations were duly approved and passed, and will be incorporated in the revised sets of Rules which it is expected will be available at an early date.

The Mornington Naturalists' Club, which is affiliated with this Club, and consists of a number of juveniles, under the enthusiastic guidance of Rev. G. Cox, has been

active during the past year, and the members have collected various interesting specimens of fossils and other natural history objects, while notes descriptive of their activities have been contributed to the *Naturalist* from time to time.

Your Committee is again much indebted to Messrs. Coghill and Haughton for kindly making their rooms available for Committee meetings. Attendances at the 12 meetings held during the year were as follow:—Messrs. St. John, Williamson and Hodgson, 12; Messrs. Keep and Daley, 11; Mr. Hooke, 10; Messrs. Pescott, Barrett, Chapman, and Audas, 9; Mr. Millar, 8; Dr. Sutton, 7; Mr. Coghill, 6; and Mr. Kershaw, 5.

In concluding their report, your Committee desires to thank all who have assisted in furthering the objects of the Club, and in stimulating interest in the various branches of natural history. It is confidently hoped that the same valuable help will be accorded the Committee for the ensuing year, in order that the prestige and influence of the Club may not only be maintained, but steadily increased.

Ed. E. PESCOTT, President.

L. L. HODGSON, Hon. Secretary.

FIELD NATURALISTS' CLUB OF VICTORIA.

STATEMENT OF RECEIPTS AND EXPENDITURE FOR TWELVE MONTHS ENDED APRIL 30th, 1927.

RECEIPTS.

To Balance in Bank and cash in hand on May 1, 1926		£28	3	2
„ Subscriptions—				
Town Members—				
Current Year	\$152	17	6	
Arrears	26	18	6	
In advance	14	5	0	
Country Members—				
Current Year	27	12	6	
Arrears	6	16	3	
In advance	5	11	0	
Associate Members	3	5	0	
		£237	5	9
„ „Victorian Naturalist”—				
Subscriptions	3	4	0	
Cash Sales	28	5	11	
Reprints Charged	6	9	2	
Refunds Account of Illustrations	5	0	0	
		42	19	2

„ Donations to Publishing Fund		9	0	0
„ Interest from Savings Bank		7	3	8
„ Sale of Club Badges		0	5	0
„ J. H. Maiden Memorial Fund,				
„ Donation Received		2	2	0
„ Plant Census Account, Sale of				
Books in Year		7	3	0
„ Wild Flower Exhibition, Octo-				
ber, 1926—				
Ticket Sales	34	0	3	
Cash at Doors	57	1	0	
Sale of Plants, Flowers				
and Refreshments	80	7	7	
Donations	1	6	0	
			172	14 10
				478 13 5
				<u>£506 16 7</u>

EXPENDITURE.

By „Victorian Naturalist”—				
Printing	£235	0	4	
Illustrating	69	18	5	
Wrapping, Despatching and				
Postage	23	8	0	
Reprints—				
Free	16	5	0	
Charged	3	12	0	
			£348	3 9
„ General Printing			12	3 11
„ Library Account, Purchases				
and Binding			22	14 9
„ Rent of Hall and Fee to Care-				
taker			13	10 0
„ Postage, Bank Charges, In-				
surance and Sundries			11	13 9
„ J. H. Maiden Memorial Fund			2	2 0
„ Char-a-banc Excursion			2	14 0
„ Wild Flower Exhibition, Octo-				
ber, 1926—				
Hire of St. Kilda Town				
Hall	9	9	0	
Purchase of Plants and				
Flowers	4	0	0	
Printing and Advertising	6	6	2	
Cartage, Freight and Sun-				
dries	23	10	7	
Donation to Children's Hos-				
pital	25	0	0	
(Balance retained in funds				
of Club, £104/9/1.)			68	5 9
„ Deposit St. Kilda Town Hall				
for 1927 Exhibition			1	1 0
				£482 8 11
„ Balance in Bank on April 30,				
1927				24 7 8
				<u>£506 16 7</u>

STATEMENT OF ASSETS AND LIABILITIES ON
APRIL 30, 1927,

ASSETS.

Arrears of Subscriptions, £91, estimated to realise	£50 0 0
E.S. & A. Bank Balance	24 7 8
State Savings Bank	175 0 0
Library and Furniture (Insurance value)	130 0 0
Mounted Badges on Hand	0 17 6
Plant Census Account (difference between cost and sales of books)	138 2 10
Accounts Owing to Club—	
For Advertisements in "Victorian Naturalist"	£7 10 0
For Reprints Charged	0 8 0
	<hr/> 7 18 0
	<hr/> £526 6 0

LIABILITIES.

Subscriptions Paid in Advance	£20 11 0
Balance of Char-a-banc Fund	2 12 0
Outstanding Accounts	24 13 5
	<hr/> £47 16 5

A. G. HOOKE, Hon. Treasurer.

Examined and found correct on June 9th, 1927.

W. H. INGRAM }
C. A. LAMBERT } Hon. Auditors.

THE ANONYMOUS GIFT.

The wonderful uplift that our Club has received in the welcome generosity of the unknown citizen, who has presented us with the sum of £200 for research excursion purposes, deserves more than a passing notice which is given to it in our annual report. I think this is the first occasion that Natural History has been so recognised in our State. There surely must result a wonderful stimulus to our work, as there has resulted an increase of membership.

The advertisement that has already accrued; and that will further come, will be of wonderful benefit to the Club, and its members, and the corresponding impulse should be a great one. The officers and Committee express their hope that members will take their work and responsibility more seriously than ever, so that the State shall not lack for Nature workers and Nature lovers in the years to come.—THE PRESIDENT.

THE HISTORY OF *FLORA AUSTRALIENSIS*.

BY CHAS. DALEY, B.A., F.L.S.

(I.)

INTRODUCTION.

In the preface to a memoir of the life of Baron von Mueller, published two years ago, the writer made mention of the disappearance of the voluminous correspondence, notes, and memoranda which were existent at the death of the eminent botanist. Enquiries had failed to bring anything of importance to light, except evidence that a mass of valuable written matter had, at different times, been wantonly burned.

An old friend of the late Baron had been asked, in 1909, to write a biography, and every facility and opportunity were given for the examination of the papers and correspondence so necessary in producing a satisfactory work. The preliminary investigation of written material was entrusted to the late Mr. Renner, formerly of the National Herbarium, whose task was to examine correspondence, etc., and select any pertinent matter. His work continued for more than six months, then, for some reasons not apparent, the project of writing a biography was abandoned, never to be resumed. The disappearance and dispersal of the papers, etc., seem to have occurred about this time, and so completely, that fifteen years afterwards no trace of them was obtainable.

About six months after the publication of the Memoir by the writer of this article, it was casually and tardily remembered that a parcel of papers had been handed in to the National Herbarium some years before, from the gentleman who had contemplated publishing, and taken the preliminary steps for writing, a biography of Baron von Mueller. On a search being made, a long-forgotten packet was found; mainly a selection of letters from Mueller's firm friends, Sir William Hooker, Dr. Joseph Hooker, and William Benthams, three of the most eminent botanists of the nineteenth century, all intimately interested in the flora of Australia. This correspondence, extending over forty years, is closely connected with the advance and extension of the knowledge of Australian plants.

From their intimate connection with the activities of the Kew Herbarium, the three English botanists, and especially Benthams, as author, were closely concerned

with the production of the *Flora Australiensis*, the classic work on the subject, in which Mueller so loyally and unselfishly collaborated. This important correspondence, salvage from the wreck, was made available to the writer for perusal at the National Herbarium, Melbourne; and the letters, in whole or in part, have been embodied in telling the story of the genesis and production of the *Flora Australiensis*, and of the cordial relations of Baron von Mueller with this trio of distinguished and great-hearted scientists.

SIR WILLIAM HOOKER.

Mueller's intercourse with Sir William Hooker, systematic and economic, commenced with correspondence on botanical matters when the former was at Adelaide, from 1848 to 1852. Hooker recommended Mueller to Governor Latrobe for the position of Government Botanist of Victoria, for some years was in close correspondence with him, and until his death, was warmly interested in Mueller's researches and botanical work.

Mueller, while on his first botanical excursion to the Australian Alps, wrote to Sir William, announcing his appointment as Government Botanist. In his next extended excursion, to the Grampians, the north-west, and the north-east of Victoria, Mueller wrote to him from the Victoria Range, and later, from Torumberry. January 5th, 1854.* To these letters Sir William Hooker replied on the 9th of April:—

Royal Gardens,

Kew, April 9, 1854.

My Dear Sir,—

I have two most interesting letters to thank you for, one bearing date, Victoria Range, the 21st Nov., 1853, the other Torumberry, 5 Jan., 1854; the latter, too, giving me the highly welcome intelligence that you are en route for the Alps, the very locality that I lately suggested to your new Governor, Sir Ghas. Hotham, as certain to yield a most interesting flora, or one that must be very instructive for botanical geography. He has promised to do all in his power to promote the cause of Botany, and to place you and me in frequent communication. No less gratified have I been with your first Botanical Report, which the Duke of Newcastle sent to me only a few days ago; and already you will see that the principal part of it is transferred to the pages of my journal. I could not help writing to the Duke expressly to tell him how pleased I was that you had been selected for such an appointment.

*For account of this journey see writer's Memoir of Life of Baron Sir Ferd. von Mueller.

If I were pleased with your report, I cannot say that I gave to our Secretary for the Colonies an equally flattering account of Mr. Swainson on the Gum Trees!!! In my life I think I never read such a series of trash and nonsense. There is a man who left this country with the character of a first-rate naturalist (though with many eccentricities), and of a very first-rate Natural History artist, and he goes to Australia and takes up the subject of Botany, of which he is as ignorant as a goose. I only wait for a spare page in my journal to show that he really is so. Though that I would not have troubled myself to do if I did not wish to draw a contrast between the two reports. It was stated in a Sydney paper that Swainson received £800 for writing all that nonsense. He makes, I think, some 300 species of *Eucalyptus* of one small district. I only hope that his drawings are valuable and fairly in possession of your garden.

I am now writing to Dr. Harvey at Adelaide. You will, I am sure, be mutually pleased with each other. His talents and acquirements are first-rate, and he is as humble and modest as he is clever. I have just heard from him from King George's Sound. He had intended going on by land to Swan River, but he dreaded the heat, and preferred searching for *Algae* in South Australia. I am now publishing two most elegant *Algae* he discovered in Ceylon, new as to Genera as well as species.

No doubt you will find the Alps to contain plants analogous to those of Van Diemen's Land, and I do hope you will collect and send to us seeds as well as specimens. Such plants would flourish in the open air with us.

I do trust your late Governor, Mr. La Trobe, is bringing home seeds and plants with him. Our last steamer took out the new Governor. Dr. Hooker is very busy commencing on the last of his three works, the result of his Antarctic voyage, the *Flora Tasmanica*, and he contemplated a visit to Mr. Sonder, at Hamburg, if he can possibly spare the time. I have just received a most rich set of Cryptogrammae from a Mr. Oldfield, in Van Diemen's Land. He is not neglectful of other plants, but has a most extraordinary affection for the Acotyledons, and we are very thankful for anyone who will be at the pains to collect them, so I give him all the encouragement I can, and there are several charming things among them. Indeed our Herbarium is daily increasing in extent and value. Last year was added to our collection all the late Dr. Bromfield's Herbarium and Library bequeathed to us, and now only last week Mr. Bentham's whole collection (the largest private Herbarium in the world probably next to my own) of plants, and his entire botanical library is given to us, and now safely deposited here. It is fortunate that the Queen has graciously given me the use of the whole of the King of Hanover's House; and 18 rooms are now completely filled with the Herbarium alone. We have two assistants constantly employed to keep them in order, and every day there are never less than five Botanists constantly working there, and yet extensive as this *Hortus Siccus* is, you will have it in your power to add materially to it.

Truly this is the era of discovery in Australia. I have just had the Report of the Navigation of the Murray sent to me. Mr. Rae has penetrated a little into the South-West interior. I have just received Drummond's very fine plants' collection,

300 miles north of Swan River, and now the Duke of Newcastle is contemplating an expedition into the North-West interior, which is, I hope, to be under the command of Capt. Shut, and which my friend, Dr. Thomas Thomson, a first-rate Botanist, is accompanying in that capacity. A capital artist, too, goes with it, Mr. Baines. I sent some seeds through the Colonial Office very lately, of the famous Argan of Morocco, to Melbourne, but whether I sent them directly to you or to Mr. La Trobe, I cannot exactly remember. In either case they will be sent to your Botanic Gardens, I do not doubt. I enclose for you a little account of the same. I think your climate would be suitable. The fruits were obtained at great expense and with great difficulty in the freshest state possible. You will, I am sure, kindly allow me to publish extracts from your letters, illustrative of the botany of Victoria. Such information cannot be made too public. Nothing in the shape of plants, seeds, or specimens have reached me yet from Victoria, nor some MSS. to which you allude. Probably the late Governor will bring them home with him.

If Mr. Swainson procured the quantity of seeds of Eucalypts he professes to have done, some of them should have been sent to Kew.

Yours, My Dear Sir,

Very truly and faithfully,

W. J. HOOKER.

In this letter may be noticed Sir William's unfeigned pleasure at Dr. Mueller's appointment, and at his success with the Alpine flora, in which, naturally, from his connection with Dr. Jos. D. Hooker, who was issuing *Flora Tasmania*, he was closely interested. The caustic strictures on Swainson seem to have been deserved, as also the approbation of Dr. Harvey, an eminent botanist, at this time making a collection of Australian Algae.

It was from this letter that Dr. Mueller first obtained information as to the project encouraged and financed by the Duke of Newcastle, Secretary of State for the Colonies, and approved by the Royal Geographical Society, to send out a properly-equipped exploring expedition to the North-West of Australia. Hooker's friend, Dr. Thomas Thomson, a first-rate botanist, who had been selected to accompany the expedition, was, however, unable to go; and, in default, it was natural that Dr. Mueller should receive Sir William's warm recommendation for the position, and thus be appointed as Botanist under the command of the leader, A. C. Gregory.

The expedition left Sydney on July 18th, and on September 24th, 1855, reached the mouth of the Victoria River. From "On board the Monarch," Mueller wrote to Hooker, in reference to the suggestion of a visit to England on return from exploration: "Should the botanical results to be gained during the journey be but pro-

portionately small, which is very possible, considering the nature of the expedition, and the probable absence of high ranges in Central Australia, I shall then *not* apply for leave of absence to return to England, but shall rather continue my labours in some part of Australia, provided the Colonial Government will again supply limited *subsidia* for that purpose." "but, if the Flora of the interior should prove so rich as to answer my sanguine expectations; and, if the means of transport will admit of my collecting all the species occurring there; and, above all, if Providence grant me life and health for the work, then I shall be greatly cheered in my home journey to Europe by the anticipation of the pleasure of paying you personally my respects and gaining so much information at your magnificent establishment."

Sir William acknowledged receipt of this letter, dated September 3rd, but giving particulars as to departure after quitting the "Monarch." His remarks as to the disposal of specimens and the rights of collectors are interesting. In an optimistic vein he stresses the desirability of Mueller visiting England, "to do what nobody but yourself can do towards the publication of your treasures."

R.G., Kew.

Jan. 4, 1856.

My Dear Dr. Mueller,—

Two days ago your most welcome letter of September 3rd, written as you were on the point of quitting the "Monarch" to undertake your arduous journey, reached my hands, and as the 7th is post day for Australia, I hasten to acknowledge it. A few days ago I replied to your former letter, written "off Moreton Bay," and sent that answer care of Mr. Moore. I wrote also to Sir Wm. Denison, and now by this post I write to Sir Charles Hotham. I hope and believe that these gentlemen, and our Secretary of State are all interested in your success, and I must try and keep them alive to it. I gave a decisive answer in favour of your receiving a full set of all the plants you gather. That I consider to be a *sine qua non* for every scientific botanical collector. If he does not deserve that he deserves nothing. I replied also to the query of Sir Wm. Denison and Mr. Labouchere, our Colonial Secretary, as to whom the collections should go to in England, assuredly to Kew. You do quite right, however, to address the packages to the Colonial Office, as you have done the box you have already (thanks to your industry) despatched.

There came to me a separate note or invoice to that effect also, and that I immediately sent to the Secretary for the Colonies, and they will inform me as soon as ever the collection arrives, and I shall send for it. I dare say it will soon arrive, if it has not by this time, and depend upon it, my son and I and Bentham will soon overhaul it, and then I shall have the pleasure of writing to you again.

My present letter I send through the Colonial Office, because they will be sure to send it officially, and I think the more familiar your name is made there the better. I have put up for you in as small a compass as I can, extracts which, I have printed from your letters and my figures of that extra-Australian *Proteaceae*, found by our collector in Capt. Denison's ship the "Herald"—and also, as I see you have gathered *Flagellaria indica*, I have put in a figured description of a new flagella plant, with habits, however, more like a grass or *Cyperaceae*, so that Brown was quite startled when he first saw it.

The little *Goodenia* from the entrance of the Victoria, is quite new, at least there is nothing like it in my Herbarium (and I have most of what have been collected by Bynoe), nor is it in De Vries's Monograph. This augurs well for the future. Indeed, I am of opinion that, though non-mountainous country, you will find a good deal of novelty. It is so distant from any region that has been botanically explored. If, too, you enter Leichardt's Country, his collection you know went to Paris. Mr. Bentham examined the *Leguminosae* and found several new ones, but the specimens so bad that they could not be described. He might as well have let them alone. You will please to pay attention to the *Zamia*'s leaves, flowers, and fruit. They have been too much neglected. Your excellent artist in the expedition will aid you by his pencil. Is the *Pandanus* of the country certainly *P. spiralis*?

Does *Scaevola Konigii* grow very large in N.A., and is not the pith very abundant and white? It has in India and China been by some considered to be made into Rice-paper. A good section of a long stem would be interesting, a foot or more long. I have been looking into Stokes's "Voyage," and he represents charming scenery, both in Victoria and the Albert. Hills rise from 200 to 800 feet. I see what I take to be *Kingia* represented in Albert River in a plate, vol. II., opposite p. 316, or it may be a bad representation of a *Xanthorrhoea*. I am amused at Stokes saying (vol. II., p. 317), that my opinion of a handful of earth he sent me, which confirmed his opinion, suggested for that part of the continent the name of "The Land of Promise."

I would undertake to find some as good in Iceland or in the South Shetland Isles, but they are not therefore "Lands of Promise" *quod* fertility. However, God grant they may prove Lands of Promise to you and all your intrepid party. Of one thing I am sure, that the country will be very interesting as regards the geographical distribution of plants. That the little *Goodenia*, allied to a species of the South of Australia, should be associated with *Flagellaria indica*, is truly remarkable, and I am much mistaken if, with your industry, ability, and research, you will not be in possession of ample materials to make it desirable you should visit England, and do what nobody but yourself can do, towards the publication of your treasures, let alone all you have collected in the South. A visit to our Kew Herbaria and Libraries and our Botanists would refresh you and strengthen you for further labours. It will be a great disappointment to us if you should not find it needful to come to Europe. However, I shall write you again I trust ere long. No doubt in the meantime some of your MSS., on being verified, ought to be published, if it were only to raise public curiosity or to prepare for what is to follow hereafter. As

soon as we shall have seen your first collections we will give you the best advice and will write to you again.

Dr. Hooker desires his best remembrances to you, and thanks for all your kind and generous mention of him. I trust we shall all meet in health. Make my kind regards to Mr. Baines, and though personally unknown to him, I should be proud to be remembered to your distinguished commander.

Faithfully and affectionately yours,

W. J. HOOKER.

The following letter was also sent during the absence of the exploring party:—

Royal Gardens, Kew.

Feb. 2/56.

My Dear Dr. Mueller,—

Where or when this will reach your hand I do not know, but I send it through the best channels, through the Colonial Office. I want you to see that we are doing the best we can to bring your exertions or important labours in the cause of science into notice. The Secretary for State for the Colonies, Mr. Labouchere, highly approves of my publishing notices from the communications I receive from you relating to your success or progress, and I send him and other official people (Sir Wm. Denison, for example) copies as they appear. Dr. Hooker and I are thus issuing two series, if I may say so, of your labours: (1) the new and rare Victorian plants, and (2) the particulars, or rather generalisations of your North-Western journeys, and with such we have begun the new volume of the *Journal* of 1856, and shall continue to do so as health and time and the information we receive from you may allow.

I should be deeply sorry if anything should prevent your visit to Europe soon after the present explorations are finished. Should your worst fears be realised, viz., that the absence of high mountains may occasion a scanty vegetation analogous to adjacent intra-tropical and maritime regions, yet the geographical limits or distributions, subjects that you never neglect, and your great ardour and enthusiasm, which will leave no species, phanerogams or cryptogams uncollected or unrecorded, all this must lead to very important results, and it is no small matter in your favour that you are so familiar with the vegetation of the extreme south of the same islands, (for you are on one of the same pieces of a circumscribed insulated ground), that you have yourself touched here and there on the East Coast, that much of the West is familiar to you, by Drummond and Preiss, etc.—and now you are in the extreme north of that fine, immenso island.

Let me say, too, that the few plants there from Stokes (gathered by Bynoe), are new and curious, and the interior plants will be found more peculiar than the coast ones. God grant you health and freedom from accidents, and I have no fear of your success. Your collections from the mouth of the Victoria River, as you were on the point of landing, have all come safe, and have been immediately despatched here by the Secretary of Colonies, and are undergoing as careful an investigation as will be necessary to make such a report as shall be sufficiently free from errors without subtracting from the novelty of your undertaking on your visit to Europe. With the heartiest good wishes, from Dr. Hooker and myself, believe me,
Your faithful and affectionate,

W. J. HOOKER.

THE NORTH-WEST EXPEDITION.

This North-West expedition under A. C. Gregory was successfully carried out, the Victoria River being traced to its source, and the character of the country determined over a vast area. Return was made overland via the Gulf of Carpentaria, the rivers Elsey, Roper, Albert Leichardt, Flinders, Gilbert, and Burdekin, being crossed, and the settled areas being reached at the Dawson River after journeying 5,000 miles in sixteen months.*

On this adventurous journey, Dr. Mueller was indefatigable in collecting specimens of the varied flora, sometimes being so occupied in his task, as to lose sight of his comrades, to their anxiety, and the no small danger to himself in this wild country. Gregory, in his report of the expedition, writes (p. 163, July 29th, 15 deg., lat. 59, long. 45) :

"About three miles before we reached the camp, Dr. Mueller had fallen some distance behind the party; but, as this was a frequent occurrence in collecting botanical specimens it was not observed until we reached the camp, when he was out of sight. After unsaddling the pack-horse, I was preparing to send in search of him, when he came up to the camp, the cause of delay having been that his horse had knocked up. This was unfortunate, as the load of one of the packhorses had to be distributed among the others, in order to remount the doctor, who requires stronger horses than any other person in the party, having knocked up four since January, while not one of the riding-horses had failed, though carrying heavy weights."

Gregory relates another instance (p. 121) : "4th Jan., Timber Creek" :—

"Started at 7 p.m., and followed up the Creek. Dr. Mueller having wandered away into the rocky hills and lost himself, I halted at the first convenient spot, having despatched several of the party to search for him, but it was not till 4 p.m. that the Doctor reached the camp."

There was little fear of the Doctor losing himself, after his wide experience travelling alone over thousands of miles in unknown country. In an interesting letter to Sir William Hooker, dated January 14th, 1857, Melbourne, and published in Hooker's "*Journal of Botany*," he gives some important details which supplement Gregory's formal account, but are mostly in reference to botanical features and camp routine.

*See Memoir, op. Baron von Mueller, p. 11.

"I found it necessary for the sake of satisfactory distinction to describe all the tropical Eucalypts (nearly 30 species) on the spot, and I was never at a loss how to discriminate between variety and species, by considering all the characters of the trees collectively, and by paying due attention to the soil, habit, structure, and texture of the bark, the manner of its decortication; consulting likewise, as very important, the insertion and form of the fruit-valves, which, before opening, from either a flat or a more or less convex vertex to the capsule, a character, which, beautiful as it is, can only be studied in living plants. Important also is the structure and form of the fertile seeds, most of the ovules becoming abortive; the former are in many kinds provided with a very long wing, although the seeds of the generality of the species are wingless."

"Impossible as it was to remain so far behind of the party on account of the hostilities of the natives, who attacked us twice, I have not secured as many kinds of seeds as I might have wished, particularly during the latter part of the exploration, one bagful being unfortunately lost on a very rainy day, when we broke through some dense mountain scrub; but when I say, Sir William, that I never lost a single minute in repose or useless occupation, I trust that you will be content with the small quantity I have to offer. My time indeed was so much occupied that I could not even write my journal at daylight, but I devoted part of my two hours watch at the bivouac fire for the purpose."

"We were roused precisely at 4 a.m. by the last sentry on watch, finished our simple breakfast in a quarter of an hour, went at once in search of our horses, and managed generally to have them caught, driven in, saddled, and packed a little past sunrise. We travelled hardly ever less than eight hours, often ten, at the rate of three miles an hour; but when grass or water was not conveniently found, sometimes considerably longer, unloading, going through our little domestic duties, repair of clothes, attendance to our noble animals (without which we should have been helpless beings in the wilderness), pitching our calico sheets, and refreshing ourselves with a hasty meal would occupy us for better than an hour, the rest of the day, about two hours a day at the average, was allotted to the respective duties of our de-

partments, I would employ myself in examining the plants around the camp, in attending to the specimens and seeds snatched on the way, or writing botanical notes. At night we stretched ourselves on our blankets, and generally in full clothes, to be ready for defence at a second's notice, the gun alongside, the revolver under our head."

"During our journey around the south part of the Carpentaria Gulf, the season was so dry that even that precious providential gift of Nature, the Purslane, was parched and bitter. Our rations were small, the salt pork, melted by the heat to a quarter of its original weight (which of course remained the standard), it became rancid and most indigestible. Game was scarcely to be had. But when we proceeded to the Eastern part of the Continent, rain-showers had refreshed the vegetation, and we enjoyed not only the *Portulaca* again, which was valuable above anything of the kind in being gathered without loss of time, and being in its fresh state, at once ready for use, but we relished also occasionally the boiled *Chenopodium erosum*, which is hardly inferior to spinach, although we could badly afford the time for collecting it."

In another letter to Sir William, dated from Sydney Botanical Gardens, on March 6th, 1859, he reports having sent 1,000 specimens, nearly 250 species, per Mr. Elsey, by the "Alnwick Castle," and states that "The Messenger," with specimens had not arrived from Java. Fifteen hundred species of the flora had been collected, five hundred of which had not yet been described.

It will be seen that the suggestion for Mueller to go to England on return from the N.W. expedition, was under consideration, but, whether he personally decided against it, or could not get the requisite extended leave from the Victorian Government, is not quite clear. On return to Victoria, he resumed his studies of the flora of the State, and directed his energies in preparation for the publication at a future date of the Flora of Australia. A few years before, owing to the strong representations of Sir Wm. Hooker, the advisability of producing works descriptive of the local flora of India and the Colonies had been affirmed, and endorsed by the Treasury, Admiralty, the Indian, and the separate Colonial Governments. Sir William had undertaken that of British North America, and he inaugurated the pre-

paration of those of New Zealand, Australia, British West Indies, the Cape, and Tropical Africa.

In regard to that of Australia, Sir William and Dr. Jos. Hooker looked to Mueller as being the botanist best fitted for undertaking the work; but it was also recognised that to perform it effectually it was very necessary to have ready access to the great collections of previous Australian botanists such as Brown, Cunningham, etc., also those of the French botanists. This was the reason why the Hookers, father and son, so strongly urged Mueller to come to England to undertake the work.

In a letter dated from Kew, June 5th, 1857, Dr. Jos. D. Hooker, who seems from this time to have relieved his father from most of his correspondence with Mueller, expresses "how sincere a pleasure your success in your botany and travels and gardens gives to my father and myself in the earnest regard my father has for you and your pursuits." He expresses their disappointment that Mueller is not coming to England to work out plants: "My father and I have the most sincere desire to aid you from here in every way," but there are so many correspondents to attend to, so little time, so much work."

"I have often felt that the best I can do towards comparing your specimens before publication, converting the proofs, etc., is infinitely far short of all you desire, and all I would be glad to do; and as it is I feel that it is infinitely less than you must naturally expect, for I know that not a half or one quarter of the queries you address to us are answered, nor half of the descriptions fully compared."

"Time is the measure of what we can do to help you."

In consequence, Dr. Hooker again urges: "I cannot therefore, too strongly advise, if there be any possibility of avoiding it, to refrain from publishing your Victorian plants until you have compared them in England." "Come to Kew" is the invitation. "No one is now nearly so well qualified as you are to publish an Australian Flora, and nobody else can do it at all."

He thanks Mueller for "valuable criticism of *Flora Tasmanica*, and begs for more. He states that he is "keeping up a very rough catalogue of Australian plants in the hope that it will be useful to you and save you much time in referring to the Herbarium."

"It already contains 6,040 Dicotyledons, and I have now begun the Monocotyledons." The final injunction is:

"I hope that you will come to England and accept my poor services in the Hookerian Herbarium."

The plants collected on the North-West Expedition had been forwarded to England, and on October 10th, 1857, Dr. Hooker writes from Kew, that his father had received "the very splendid and most interesting collection of North Australian plants which have given the greatest satisfaction. They are in all respects better than could possibly have been expected, and we are quite at a loss to imagine how you could have managed to collect so much and preserve so well, on so hazardous and fatiguing an expedition." He mentions that some genera had been published in the last number of Hooker's "Journal of Botany." Of the remainder the comment is that it "is quite impossible for anyone to do much with them but yourself." He is engaged on the floras of Tasmania and of India and has his time fully occupied.

In a letter from Kew, June 22nd, 1858, Dr. Hooker suggests that Mueller should join the Linnean Society, and in referring to Acacias and Eucalypts, writes, "Mr. Bentham very kindly revised the former, and you will be surprised to hear that it took him upwards of a week's hard work; working as you do, you have evidently no idea of the time and care it takes to turn out satisfactory botanical work. Comparing specimens and descriptions and confirming synonymy and reference with proper care, is much slower work than you are aware of. We think no errors trivial or venial that can be avoided with proper care and proper materials. You have no conception of the amount of trouble and time it takes to correct an error of identification."

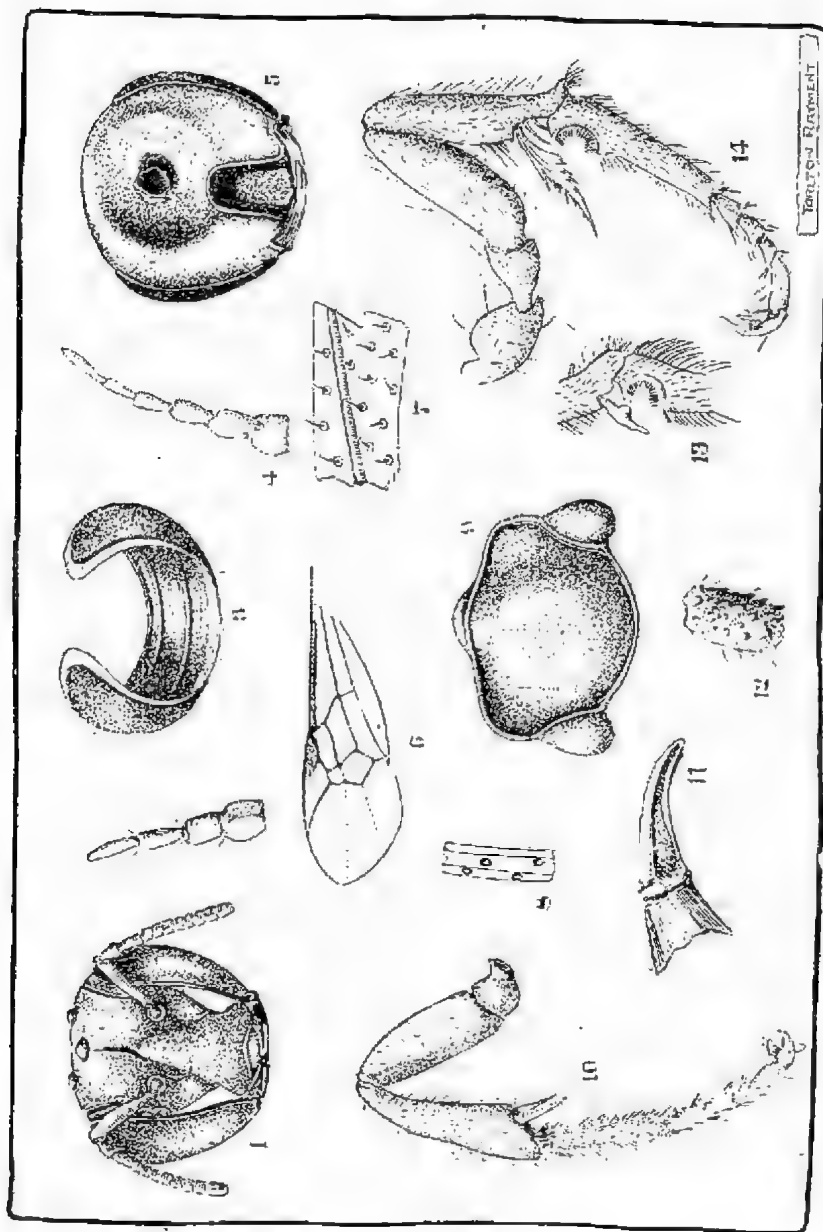
"The slap-dash style of publication has brought the science into terrible confusion already. The whole of your extensive and splendid collections are now put away in the general Herbarium. They are truly wonderful, and the knowledge you have displayed in naming and arranging them is very great."

(To be continued.)

EXCURSION TO GEOLOGICAL MUSEUM.

By permission of the Director of Geological Survey of Victoria (Mr. W. Baragwanath), the Museum was specially opened on Saturday, May 21st, for this excursion. Sixteen members and friends attended, and a general inspection of the specimens was made, particular attention being paid to carbon in its various forms, and its inorganic compounds. I would like to acknowledge the courtesy of Mr. W. S. Abraham, the Curator of the Museum, who was present, and made available some valuable specimens not usually on exhibition.—A. E. RONDA.

Plate IV.



Details of Bee, *Euryglossa asperithorax*, sp.n.

A NEW AUSTRALIAN CLIFF-BEE.

Euryglossa asperithorax, Sp. n.

By TARLTON RAYMENT.

TYPE ♀.—Length about 4 m.m. Entirely black, with the exception of pallid spots on tibia and tarsi, and two distinctive pallid crescents at sides of clypeus. Head ordinary, eyes converging below; clypeus flat, with a few short stiff pale hairs; supra clypeal area rising at its apex to a median ridge. Frons coarsely and excessively punctured, with two small sutures parallel with the compound eyes. Mandibulae acute, obscurely red at tips. Antennae ordinary. Mesothorax dull, and under a 1 inch objective well punctured, with several striae radiating from each puncture; a sharp ridge along the median line, a sparse coat of short stiff pale hair. Scutellum sharply depressed at each side, two pallid spots near mesopleura. Abdomen ordinary, shining, well punctured; hind margins of segments obscurely paler, a sparse coat of short stiff pale hair. Legs black, except pallid patches on apical ends of tibiae and distal ends of tarsi. Tegulae black, with pallid margins. Nervures almost black, stigma black. Wings hyaline.

On flowers of *Goodenia ovata*, and *Olearia ramulosa*, February 23rd, 1927, at Sandringham, Port Phillip, Victoria.

Has a superficial resemblance to *Euryglossa goodeniae* Ckl. and *E. oleariae* Raym, but the pale crescents, and the unique surface of the integument of the mesothorax, at once distinguishes this species.

KEY TO PLATE.

Details of *Euryglossa asperithorax* sp. n., at various magnifications:—

- 1, Front view of head capsule.
- 2, Labial palpi: note the stout basal joints that are characteristic of bees included in this genus.
- 3, Abdominal "half-ring" or tergite, showing the ridges or apodemes which serve as reinforced ribs for the attachment of muscles.
- 4, Maxillary palpi are of six joints: the basal one is the stoutest.
- 5, Rear view of head capsule.
- 6, Anterior wing: the small square cubital cell receives both recurrent nervures in this genus.
- 7, Portion of wing highly magnified to show the minute hairs that cover the membrane.
- 8, Portion of sting showing pores: perhaps olfactory in function.
- 9, Mesonotum and tegulae.
- 10, Hind leg: note absence of pollen-combs.
- 11, Mandible or jaw.
- 12, Portion of spinose surface of hind tibia of *Euryglossa goodeniae*, Ckl.; this is another characteristic of the genus.
- 13, The antenna clearer on front leg of *Apis mellifera*, Linu.
- 14, Front leg of *Euryglossa fasciatella*, Ckl.; compare the serrate form of peg with that of the Hive-bee, *Apis*.

THE CLIFF-BEES.

BY TARLTON RAYMENT.

September is a mercurial month—sunshine for one day, and a cold, bitter wind the next. On the fine days I go along the coast to make the acquaintance of the wild-bees, waking from their winter sleep. Of course, I find many of them a-wing, for that is the easiest part. But I am like Fabre, for I desire to know how the creatures live and have their being.

To find the nest is a matter of some moment, and since I cannot learn the insects' story without interviewing them in their own domain, why, I must just keep on searching. Each Spring my first glimpse of this bee is obtained about the first week in September, when I note hundreds of them flying over the tips of the Tea-tree, and since these twisted growths are the chief feature of my coast-line, I have plenty of material to go over.

I think it was Tickner Edwards, in the "Lore of the Honey Bee," who first suggested that the young *Apis*, or hive-bees, had to learn how to garner the pollen-meal, and search the flowers for nectar; but a life-time spent among honey-bees fails to provide me with any evidence in support of that contention. When I first discovered the Cliff-bee, *Euryglossa fasciatella* Ckll., and other wild bees concentrating over the tips of the Tea-tree, the blossoms, of which were unopened, I began to think the Tickner Edwards might be right after all. Second thoughts, however, were sufficient to make me realise the error. The bees are all young ones that have never harvested from any flowers, and there is not one old bee present to teach them "the tricks of the trade."

The insects certainly look in the right place for the flowers, but are a week or so too early. Now I do not find these insects on any other plant but Coastal Tea-tree, *Leptospermum laevigatum*, and it is an astounding thing that they are able to congregate about the trees as though anticipating the source of the supplies.

When I remember the many debates on how bees find the nectar in blossoms, I am still further confounded by these assemblages. You probably have heard all about the brilliant ray-petals of many flowers being mere flags to attract the honey-gatherers that find the nectar sources by sight. On the other hand, we are assured that the olfactory powers of the bee are so highly developed that honey-plants are found by "scent" alone.

But the Cliff-bee, emerging from its winter retreat before its food supply is available, hovers persistently over the "promised land." How am I to account for its perspicacity? I have captured males among the bees that congregate in this way, but I have never been lucky enough to see them mate, though I believe that the nuptials are celebrated about the budding Tea-tree. There are no white sign-boards to "catch the bee's eye," neither is there any ethereal odour to tickle its sense of smell. Fortunately, I do not have to account for the gatherings; I simply tell you of the place and time when you may observe the phenomenon for yourself.

But the Cliff-bee is small in stature, and has a rapid flight that soon puts her out of view. For many seasons I have examined the shores with extra care in the endeavour to locate the home. At odd times, when I thought I had seen a black bee dive down into the grass, I have patiently picked off the green blades, one by one, until I had laid bare quite a large area, ever hoping to uncover the tiny shaft. I am blessed with very good "eye-sight," but these small, black bees test it to the extreme limit, and often without availing me anything. I certainly found other nests, but I will write of them in another place.

It is disconcerting to have people stand and watch you carefully plucking away the grass, stalk by stalk. The most unsatisfactory part is my knowledge of their thoughts. One morning, when I was returning from my swim, I was fortunate enough to see a Cliff-bee alight on a patch of bare ground, but in my anxiety to obtain a closer view, I made an incautious movement: "Zip," she was away. Subsequent examination of the area failed to disclose a single shaft. But this chance happening gave me food for thought.

At Sandringham, on the eastern shore of Port Phillip, the cliffs are 50 feet or more in height, and the "face," which receives the full brunt of the hot, summer sun, and resists the south-west winter wind, is composed of a light-yellow, stiff clay, mixed with much fine white sand, a combination that is due to the decomposing of the original stratum. These cliffs rest on brown rock, the particles of which are cemented together with much iron-rust, and is known locally as a pseudo ironstone. Needless to say, wherever that dark foundation runs down into the water, it forms a series of small capes that resist the pounding of the winter gales. In between, the softer sand and clay mixture weathers away, so that

coves are formed, with lovely half-moon beaches of golden sand. The top of the cliff is covered with a fine, sandy loam.

Many people of the district do not walk along the asphalted ramps when going down to the water, but simply "slither" down the face of the cliffs, and this foot-traffic, combined with the erosion caused by thrashing of the wild "south westers," soon results in numberless "washouts." I say the fierce trials of such an exposed face soon weather away the softer portions, and leave the harder almost rock-like strata, standing up in barren escarpments.

It was in such inhospitable country that I saw the Cliff-bee alight, but I found nothing. All that morning I had searched the coast without result. It is not my habit to eat much lunch, but the house-wife prefers that I leave the bees for an hour at noon, and come home, if only to drink a mouthful of coffee. Home I go.

But I cannot forget that a Cliff-bee alighted in a washout, in a barren, sun-scorched, wind-swept place without any protection whatever from the brawling sea. Why, in winter I have often watched the spume and spindrift whirling up the face of the cliff like smoke-wraiths. Surely no-bee would be so bold as to build there in the sand-stone.

No, I cannot write: even the paint-box fails to charm me. Nothing in my home will content me, so I go out once more to take up the quest for a tiny tube less than one-eighth of an inch in diameter. It does seem rather a futile thing for a man to do. Nevertheless, such is my nature, that I go down and traverse almost the same ground that I had searched before noon, but this time I concentrate on the hardest portions, and though it seems that the bee could not dig in such firm concrete, I still persevere. It seems ridiculous, but I have the patience of Fabre. I also have the luck of that lovable old Frenchman, for I am rewarded.

Right in the hardest ridge that defies the weather I find dozens of tiny black holes. I take out my strong pocket-knife—it is the only implement I have at the moment—and stab at the rock-like clay. I succeed in splitting off a slice about half an inch in thickness: the holes still go down. I almost break my blade, but I manage to clip off another inch. Of course, I make some dust, and I remove this debris very carefully so as not to block up the little shaft.

To my disgust, in among the loose, white grains, I find a bee's head with the *antennae* still quivering. But my disappointment is tempered by the knowledge that at last I know where the black Prosopoid Bees nest. Here are dozens of tiny burrows.

The shafts I uncovered were slightly winding, and not more than three inches or so in depth. The sides were so smooth that the ubiquitous varnish was at once suggested. However it may be, the lining of the shaft was fairly hard, and resembled the glaze of dark earthenware.

Each day the Cliff-bee continues its excavating, and I see her burrowing with great energy. Some new arrivals attack a bare spot, and at once begin to bite out the quartz granules, grain by grain. The digging of the shaft is an heroic labor, but at length the bee gets her head buried. Darkness intervenes, and the little laborer flies away to shelter for the night in the old winter burrow.

Early next day she is at the work again, and, by noon, she is down nearly an inch. I see her pushing out the grains, aggregating a match-head in volume, and which are just moist enough to hang loosely together; the load is levered out by the hind legs and the end of the insect's body. She does not cast the material away, and so long as it reaches the mouth, she is fully content.

But her laxity results in the formation of a screen that almost hides her labors. More-over, when the bee returns from refreshing herself at the white flowers of the Tea-tree, she sometimes mistakes another's moundlet for her own demesne. As soon as she alights, the Cliff-bee rakes aside the loose spoil, and seeks to enter. At once an irate owner appears from below, and bids her begone. But the Cliff-bee has a poor sense of location and the unerring homing precision of the Hive-bee is unknown to her.

For weeks at a time, I watch her digging her burrow. Though I do not see her do it, yet the fresh spoil at the pit-mouth tells me of the laborer down below. In between spells of labour and refreshment, I see her sitting at the door, and blocking it with her tiny, black head, just like the *Halicti*.*

When I move, she descends a trifle; I retreat, instantly, her head reappears. I keep on repeating the

*See *H. raymenti* and other *Halicti* described elsewhere.

manoeuvre, but I desist first, for her patience is greater than mine.

At this stage I open a number of nests, but all that I find is a lone bee crouching in the bottom of the shaft. I discover a number of deserted winter burrows, which still house an odd female or two that have not yet started their new shafts. In one or two I find a dead bee, and it is plain that when she matured she had been unable to pierce the sand-plug at the top of the shaft, and had never known the light of day, and the joy of life in the sunshine.

It is a very easy matter to distinguish these old deserted nests, for at the bottom there is always a tiny chamber, about the size and shape of a large grain of wheat, and which is lined with a wonderfully delicate, silvery, skin purse. This marvel of workmanship is slightly yellow with age, and is always buried with an inch of loose sand. You see, when the shaft is completed, the mouth is closed with a sand-plug, and to reach day-light the baby bee has to bore upwards; the grains so displaced fall to the bottom and so fill up the purse or cradle.

At first, I thought that the Cliff-bee carried no pollen-granules because she was only seeking sustenance for herself, and, therefore, needed no pollen until the nest was completed. However, the bee is almost devoid of hair, being smooth and shining, so that she has no harvesting tools. But she does collect plenty of pollen-meal, as we shall see presently.

I notice, too, that when the Cliff-bee alights, the body-rings expand and contract in a very rapid manner, the pulsations, if one may use the word, being about four to the second. Panting may not be an unsuitable word to describe the action.

I find it essential to see the nests every day, for if I miss a visit there is sure to be something done that I regret having had no opportunity to observe. If the weather be dull, as it often is in September, when the falling hand of winter still clutches at the wings of the Southern breeze, I find the Cliff-bees sitting at the doorways, and blocking the entrances with their heads. It seems that no work is undertaken unless the day be bright and warm. When the climbing sun overpowers the "nippy" wind, the bees, making several feintings and retreatings, emerge from the shafts. To all intents and purposes they imitate the suspicious behaviour of the

Hive-queen when she first issues from the natal queen-cell.

When the bee is away the entrance of the home is left entirely uncovered. Only once have I seen two bees come out of the shaft, and though I have examined hundreds of nests, in only one instance have I found two cells. In the latter case, the lower silvery purse looked as though it belonged to the previous season, for it was full of sand, showing that the original occupant had cleared out the entrance plug before the second purse had been constructed.

My field notes show that all through October the bees mate, and are occupied with the excavation of the shafts and the collection of stores from the Tea-tree. About the first of November I note one or two covering up the portals of the homes with a few loose grains of sand, so I unearth quite a number of nests, and in every case I find a solitary cell at the bottom. The chamber, I say, is about the size and shape of a large grain of wheat, and the wall is covered with an extremely delicate, silvery tissue of impalpable fineness. Should I draw the edges of the purse together I am quite unable to separate them again.

This bee has a broad tongue-tip, that I know makes an excellent trowel. This clever bee weaves with the plasterer's implement. She stands crosswise in the cell, and begins a series of head-noddings with her tongue protruding and travelling from floor to ceiling with quiet rythmical movements. Each swing of the head lays down a thread of clear liquid that instantly hardens into a membrane. Over and over the interior wall a web is woven, and the minute interstices are filled in with the same action and material until the skin is complete. The threads seem to amalgamate perfectly, for the material is waterproof, and cannot be of a resinous character, because it is insoluble in turpentine. It does not adhere to the smooth walls, although it is formed on them.

When the cell is ready to receive its stores, the silvery purse, urn, or cradle, what you will, is like an egg, with the end removed, and the stores are of the consistency of thick batter, and are olive-green in colour. The unusual tint is due to the dark honey and pollen gathered from the Coastal Tea-tree, the only plant visited by this bee. The pollen is carried home in the insect's honey-sac, and the granular nature of the stores leads me to suggest that

there is about 50 per cent. pollen. The great majority of the cells are slightly more than half full, and the consistency of the food is the same throughout.

Once or twice I have found cells containing a tiny drop of white liquid, resembling milk. Ah, what an intriguing discovery! What a wonderful opportunity to hint that here is the beginning of the undigested pap of the Hive-bee, the concentrated super-food that forces the development of that fecund mother! No, I give you the bare fact that, in odd cells, I have found a drop of white liquid. I make no comment whatever.

Once or twice I have uncovered cells two-thirds full of stores, and since the silvery purse is not closed at once, it looks as though the mother added to the amount, but I have to confess that the larvae on the extra food were no older, or larger, than those on the smaller amount.

You may say that males emerge from the scanty provisions, and females from the abundant store, for that is the rule in Beedom. Well, I do not know, and I am just as anxious as you are about the point. I find that each mother makes but two burrows, each with one cell. At least I have had individuals under observation for the entire season, and have seen them make only two shafts. Now, do the first ones produce females and the second males? I cannot answer the question.

"Rather helpless."

Perhaps, but no matter, I make the admission freely.

The egg is floated on the top, and when the shell breaks, why, the larva has only to open its mouth and begin to feast on the tasty batter. In a fortnight it is fully grown; the stores are all consumed; the cap is woven to close the cradle cell, and the larva enters into the mysterious sleep from which it will be awakened, by the wafting of some fairy wand, to find itself changed into a new creature gifted with *antennae*, legs, eyes, sting and wings.

I take some of the larvae on October 24th, and I lift them out in a simple manner, so as not to disturb them unduly. I have on hand some small medicine bottles of two ounces capacity. By pressing a glazier's diamond on the side, about $\frac{1}{8}$ inch from the bottom, I am able to rotate the bottle so that a cut encircles it. A tap with the cutter and the bottom falls off, sometimes smoothly, sometimes with jagged edges. The latter kind are best for the Cliff-bee nests, because I can surround the cell, and by turning the bottle can use it very successfully as

a bore to take out a circular core containing the cell.

By the first of November the Tea-tree flowers are all gone, and no longer do I find the Cliff-bees a-wing. I visit many of the nests, but all are closed with a few grains of loose sand just at ground level. I remove them carefully, and am astonished to uncover a sepulchre. Behold the corpse of the worn-out mother.

I say that the industrious parent, exhausted by the heroic labour of digging out of stone two twelve-inch shafts, and the weaving and provisioning of the silken cradles, closes the shaft with a one inch thick plug of sand placed a little below ground level. Between it and the surface there is just room for a mortuary. Immuring herself in that dread chamber, and with her strength rapidly waning, she performs her last unhappy task. A few grains of quartz are drawn loosely over the aperture, and the indefatigable mother now awaits the call of Death. At the bottom of the shaft there is a natal chamber, and at the top is a Sarcophagus of Death. 'The child will emerge to life through the very bones of its creator.

In my bottles I have life. I see that the larvae are not curled up like those of the Hive-bee, but lie in the cells, almost straight. Whereas the larvae of the Hive-bee are pearly white, with the segments convex, as though they were about to burst with fatness, the larva of the Cliff-bee is dull-white in colour, and the segments are concave.

I gathered these larvae on October 24th. It is now February in the new year. What a long sleep, but now I can see beginnings of movement; the tail part wags slightly, and the larval skin looks more flacid. Each succeeding day the skin gets drier, and on February, the 7th day, the skin splits, and a creamy-white pupa struggled out with strong actions. Even the eyes are white, and the antennae are crossed in front like the hands of a saint's effigy. The wrinkled larval skin or *pellicle* is at last cast behind; this is the awakening after more than four month's sleep in a temperature of 75 degrees F.

Three days later—February 10th—the pupa is unchanged, save that the two compound eyes are showing just the faintest trace of a drab pink colour. By the 14th, the eye-tint has deepened to a dull lilac-pink shade. The next day: Compound eyes are now definitely dark-maroon, with the ocelli the smallest of three dark specks.

The body color now slowly deepens to a drab white, which strengthens day by day until

February 23rd, when another larval skin is moulted, under low magnification I watch the hind pair of immature legs, endeavoring to thrust off the *pellicle*, which appears to be still attached to the anal end. The abdomen keeps up a strong wagging movement.

February 28th.—The head is now a dark coffee-colour, with the eyes deep maroon, the mouth parts, which seems to project in a very marked manner, are rusty-red, the top of the *thorax* is now distinctly dark slate; another larval *pellicle* has been shed during the night.

The sable colour gradually extends from the *thorax*, but there are two darker spots on the under part of the abdomen. Colouring is slowly deepening.

March 3rd.—The slate shade has merged into black at the top of the *thorax*; the pigment may now be observed entering the legs at the *coxae*; the *scape* is now almost black, though the *antennae* are still a light coffee colour. The tarsal joints and the tip of the abdomen are the last to be affected.

March 5th.—The colour is now uniformly black, with the exception of the tips of the *antennae*, *tarsi*, or foot joints, and the underpart of the abdomen near the anal end. The immature legs are constantly endeavouring to dislodge the two dried skins.

March 8th.—The elements of the wings, folded towards the under-surface of the *thorax*, are now plainly visible. Hair is showing on the *tarsi*, which are fully developed with the exception of the pad (empodium or *pulvillus*), and the claws (*unguiculi*).

March 12th.—The mouth parts still protrude, and appear to be blood-red. The *antennae* are still clasping the under-lip, and the elements of the wings are folded round under the *thorax*.

March 14th.—The bees have reached the imago stage, for they are now fully developed, with wings complete in final position. But the insects are lethargic, and scarcely move; the abdomen is rather plump compared with that of other Spring-flying bees. The period required for development at the temperature mentioned, is more than 200 days.

But I must leave the Cliff-bees, for one must eat, and the night falls quickly.

I am greatly indebted to Prof. T. D. A. Cockerell for his help in connection with my studies of Australian bees.

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FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall, Victoria-street, on Monday, July 11th, 1927. The President, Mr. E. E. Pescott, occupied the chair, and about 100 members and visitors were present.

DEATH OF MEMBER.

The President referred to the death of Mr. W. H. A. Roger, an old member of the Club, and members stood as a mark of respect. It was resolved that a letter of condolence be written to the relatives of the deceased member.

CORRESPONDENCE.

From Country Roads Board, stating that consideration would be given to the Club's request that the Geelong Road be planted exclusively with Australian evergreen trees.

From Chief Secretary for Victoria, stating that consideration would be given to the Club's representations in opposition to an open season for the trapping of opossums.

From Chief Secretary for Victoria, intimating that the request of the Club that it be afforded an opportunity of submitting nominations for representation on the proposed Advisory Council in connection with matters pertaining to native fauna, would receive consideration when this subject was under review.

From Bird Observers' Club, stating that it was proposed to form an Advisory Council to make recommendations to the Chief Secretary in regard to the preservation and propagation of native fauna, and inviting this Club to appoint two delegates to a Conference to be held on July 19th to consider this matter.

The President referred to the recent action of the Chief Secretary in refusing to sanction an open season for the trapping of opossums, a decision which was most gratifying to members of this Club, and kindred societies.

Messrs. A. E. Keep and G. Coghill were nominated to represent the Club at the Conference arranged by the Bird Observers' Club on July 19th, and were elected unanimously.

REPORT.

A report of the excursion to Sherbrooke Gully was given by Mr. A. G. Hooke.

ELECTION OF MEMBERS.

The following were elected as ordinary members:—Miss Elizabeth Andrew, B.Sc., 93 High-street, Kew; Mr. J. L. Stamp, Menzies-street, Brighton; Dr. H. Flecker, 71 Collins-street, Melbourne; Mr. A. S. Kenyon; M.I.E.Aust., "Marringal," Plenty-road, Heidelberg; and as a country member:—Mr. Thompson Noble, Campbell House, Campbell-street, Castlemaine.

GENERAL.

The President announced that arrangements were being made for an inspection on July 23rd, by members of the Club and others, of the Tea-tree growing along the foreshore, from Brighton to Mornington, in order to ascertain the cause and extent of the decay of and damage to this valuable growth.

The President read a letter from Mr. John Wilson, of Cheltenham, referring to the proposed granting of permissive occupancy of portion of Cheltenham Park for parking motor-cars. It was urged that a strong protest should be made. Mr. F. Pitcher moved: "That the Secretary for Lands be written to asking that a deputation be arranged to interview the Minister for Lands, in order to urge the refusal of permission for any portion of Cheltenham Park to be used as a parking area." The motion was seconded by Mr. F. G. A. Barnard, and supported by Messrs. A. J. Tadgell, C. Barrett, A. L. Scott, and A. D. Hardy, and carried unanimously.

The Hon. Secretary announced that Hon. G. M. Prendergast had consented to open the Natural History Exhibition on July 20th, and that His Excellency the Governor (Lord Somers) had accepted the invitation of the Committee to perform the opening ceremony at the Wild Flower Show on September 27th next.

Mr. A. D. Hardy reported that the Committee of Management of the National Park at Sperm Whale Head had now been appointed, this Club being represented by several of the members.

Mr. W. Ramm referred to the open season for opossums and koalas recently declared in Queensland, and suggested that the Club should take action to have the declaration withdrawn. It was decided to communicate with the Queensland Naturalists' Society on the matter.

PAPERS, ETC.

Mr. G. Coghill read a paper on "A Holiday in New Zealand," descriptive of many of the interesting and scenic portions of the North and South Islands; reference being

made to the botanical features observed. The paper was illustrated by a series of lantern slides, loaned by the New Zealand Tourist Bureau.

EXHIBITS.

By Mr. C. H. Borch: A rare Victorian Lycaenid, *Miletus delica*, from Springvale. Larvae, attendants to larvae, pupa cases from which butterflies had been bred, and perfect insects.

By Mr. A. N. Burns: Rare Lycænidae, from Cairns district, North Queensland. All the species exhibited, with the exception of *T. cyanea-arinia*, Fab., may be regarded as rare, being found only in isolated, favoured spots even though their food plants are widely distributed. Butterflies of the genus *Miletus* are noted for the brilliant markings of the underside. Among others, the exhibitor bred *M. narcissus* and *M. arinia*, in 1926, this very probably being the first time these two species have been bred. "Rainbow," or "Great Day-flying Moth," *Nyctalemon orontes*, of North Queensland. These insects fly in countless numbers, usually from North to South, during the greater part of the year. At times, in selected spots, generally in scrubs or near rivers and creeks, they may be observed resting with outspread wings, often in such numbers as to weigh down the branches. The great flights of "many-coloured butterflies" recorded from North Queensland were, in reality, flights of these moths. Twenty or more may easily be captured with one sweep of the net.

By Mr. G. Coghill: Dried specimens of New Zealand flora, fruits of Cape Gooseberry, *Physalis Franchetii*, a native of China; Maori carvings; volcanic bomb, greenstone and pumice-stone from N.Z.; poi-poi used in dances; photographs of N.Z. scenes, etc.; cultivated specimens of *Grevillea rosmarinifolia*.

By Mr. C. J. Gabriel: Marine shells: *Humphreyia strangei*, A.Ad., Western Port, Victoria; *Aspergillum vaginiferum*, Lam., Red Sea; *Aspergillum pulchrum*, Desh., Singapore; *Dacosta australis*, Sowerby, Port Jackson, N.S.W.; *Gastrochaena tasmanica*, T.Wds., Port Phillip; also a series of New Zealand shells.

By Mr. L. L. Hodgson: Cultivated specimens of Rosemary Grevillea, *G. rosmarinifolia*, and Crimson Bottle-brush, *Callistemon citrinus*.

By Mr. E. E. Pescott, F.L.S.: Foliage of variegated form of *Agonis flexuosa*, rare; flowers from cultivated plants of *Thryptomene calycina* (F.v.M.), Stapf.; Stone

implements, crude and finished, from New Zealand, seed-pod of the Australian *Wistaria*, *Milletia magasperma*.

By Mr. F. Pitcher: Specimens of 36 Ferns and Lycopods of Southland district of Otago, New Zealand, 12 of which are also to be found in Victoria.

By Miss J. W. Raff, M.Sc., F.E.S.: Specimen (from the Botanical Dept., Melbourne University) of a low-growing Alpine plant from New Zealand—the so-called "Vegetable Sheep," *Haastia pulvinaris*.

By Mr. A. L. Scott: Sands from Rainbow Mount, and pitchstone from Rotorua, N.Z.

By Mr. F. E. Wilson, F.E.S.: Beetles from New Zealand: *Prionoplus reticularis*, White; *Liasotes reticulatus*, Westw.; *Lasiornynchus bardicornis*, Fab.; *Costlya discoidea*, Brown; *Syrphetodes tuberculicostatus*, White; *Navamorpha lineatum*, Fab.

BUTCHER-BIRDS AND MINERS.

I have lately been watching with some interest the manner in which a Butcher-bird, *Croacticus torquatus*, manages to evade a fancied—or possibly real—danger, while gathering his breakfast from the scraps which are put out every morning for the larger birds that visit our garden.

We have often noticed that no birds excepting Noisy Miners, *Myzantha garrula*, dare to take scraps from the bird-table, while Magpies, *Gymnorhina hypoleuca*, are there, and that Butcher-birds are especially timid in the presence of their big relatives.

It seems, however, that Butcher-birds recognise the daring of the Miners, but know also that they are themselves among the few birds of which Miners are afraid. Knowing this, they have little difficulty in getting food. They wait at a safe distance while a Miner slips among the Magpies, and takes a piece of meat, which usually he carries some yards away before alighting to eat it, then follow him threateningly. After a little hesitation the Miner drops his food, and returns to the bird-table for more. While he is away the Butcher-bird enjoys a stolen dainty, and returns to his post, where he awaits another, or sometimes, the same, victim.—J.G.

MICROSCOPICAL NOTES.

PARAMOECIUM.—Science teachers desiring a plentiful supply of material for class work, will be glad of this bit of information. *Paramoecium* may be "cultured" in vast numbers by feeding the animals on a piece of hard-boiled yolk of an egg. This seems to have a special attraction for them; if a small piece is dropped into an aquarium, in a day every *Paramoecium* in it will be found struggling for a better position near the choice morsel. A loop-ful placed on a hollow-ground, 3 x 1 slip, will show the animals in every stage of reproduction—conjugation, fission, etc. A cover glass placed over them will prevent evaporation for a long time.

AMOEBA.—If a handful of pondweed is placed in a crystallising dish, or large petri dish, and just covered with water (and protected from dust and rapid evaporation by a sheet of glass), and placed in the sunshine on a window ledge, a constant supply of fine Amoeba from the decaying weed is assured. *Intra vitam* staining will show mitotic division in the nucleus beautifully.—J. SEARLE.

THE ROMANCE OF PLANT NAMES.

BY EDWARD E. PESCOTT, F.L.S.

When one studies the botanical names of plants, their origins and their meanings, a new and entrancing world is at once opened to him. It is helpful to the botanist to know name meanings, for if, and when he does, he would never look for *Poa aquatica* (growing in water) on the hill-top; neither would he search for *Stipa eremophila* (desert loving) in a swamp.

But it is not this aspect that I was thinking of, so much as the personal one. I often wonder what Labillardiere really saw when he so named *Chorizema*, which means a drink and a dance. Did he find the West Australian aborigines dancing around a well? or was he so pleased at finding water one day, that he and his men danced for joy? Who can tell? We shall never know. But we can, and do, enjoy both the name and the beauty of the plant to which it was given.

When a boy, I used to enjoy visits to the coast at Christmas and New Year time; and an added enjoyment was the presence of many white berries, which my companions and I ate with great enjoyment, and which were growing on what we called "Tea-tree." I now know these shrubs under the cold name of *Leucopoyon Richi*, the "Coast Beard-Heath." To-day, the berries are sickly nauseous; but then boys will eat anything. The plant is interesting now, not for its berries, but for the fact that it commemorates the name of Lieut. Riché, who accompanied Labillardiere's expedition, and being lost for three days, subsisted on these berries.

What a wealth of memories the name *Banksia* recalls. First there is the cabin of a small "windjammer" off the coast of New Zealand, and three men sitting in conference. Cook wanting to return home via the cape, and Banks wishing to explore New Holland; the latter prevailed, Cook consenting reluctantly. The next scene is a well known picture, for who now cannot visualise the landing of Captain Cook. One of the first plants they would see was a *Banksia*, so aptly named by Linnaeus, commemorating a great man and a great circumstance. Linnaeus made a suggestion that this land should be called "Banksia," but it was never carried out. The genus now named "*Pimelea*" was earlier designated "Banksia" by Forster: but Linnaeus' name stands, and rightly so.

The beautiful blue flowers of *Dampiera* bring us back to our boyhood's days, when, remembering the rough old buccaneer Dampier, we recall all of our dreams of pirates, treasure, hidden gold, and what not!

I have told the tale before of *Prasophyllum Frenchii*, but it will bear repeating. Over twenty years ago this orchid was discovered in two separate localities, first by George French, son of one of our Club founders; and by another, a founder of the Club, F. G. A. Barnard. As George French was working with Baron von Muëller, he presented his specimen to the Baron at nine o'clock, when it was at once given its present name. An hour or two later Mr. Barnard came in with his specimen—too late for it to be named "*Prasophyllum Barnardi*." We still wait for this latter name.

A remarkable little piece of personal history is revealed in the genus *Browallia*, which is not an Australian genus; but we grow some of the species in our gardens. The plants are all of American origin. John Browall, a man of humble origin, defended the sexual system of plant classification originated by Linnaeus, against the attacks of a man named Siegesbeck. (This man's name is familiar to us in one of our common native plants, *Siegesbeckia orientalis*). Linnaeus was so delighted at the defence, of even so humble a man, that he constituted a new genus *Browallia* in his honour, the species being *B. demissa*, this name having reference to Browall's humble origin.

Later, Browall rose to honour, becoming a Bishop; and, another species having been discovered, Linnaeus named it *B. exaltata*, in honour of his exaltation. Strangely enough, this made Browall very angry, he showing his annoyance by writing pamphlets against Linnaeus in most severe language.

Then a third species was discovered, and Linnaeus, recording the incident, named it *B. alienata*. It is to be recorded with regret that the two remained alienated, never again becoming friends. Thus a friendship and a quarrel are for ever commemorated. I'm glad we don't do such things now-a-days.

He who gives quickly gives twice, a Spanish proverb says. We are already indebted to Mr. V. Miller for generous help in connection with the wildflower shows, and now he is giving to the Club a typewriter, costing £9. Club correspondence has greatly increased, and a typewriter for use by the Hon. Secretary has long been needed.

THE HISTORY OF *FLORA AUSTRALIENSIS*.

(II.)

BY CHAS. DALEY, B.A., F.L.S.

Again, on August 25th, 1858, Dr. Hooker writes:
.. "I feel very much that you should desire the honor of publishing your discoveries, but the interests of science should be first consulted, and what we do now so much want is good observations on previously known plants. I wish, too, that you would publish in a more methodical form. It is extremely difficult already to refer to your published descriptions, and I am sure that I omit referring to some that I would not intentionally give the go-bye to,—but life is short, and books are long; and the indifference of men of science to the convenience of posterity and cotemporaries in publication is tending to unavoidable confusion. I am sure that you will not think me censorious in saying so much. . . . but no one, who has not worked in a great library and Herbarium, has any conception of the amount of labour and time lost in approaching completeness and accuracy in descriptive botany."

In another letter, dated from Kew, December 20th, 1858, Hooker makes a last appeal for Mueller to come to England:

"Systematic monographs and floras are what we now want, and we do look with the greatest anxiety to your visiting England, and throwing your magnificent materials into a connected whole. I am striving to do this for the Indian flora. Harvey is going to begin the South African, and all I can say is that you shall have every assistance for the Australian that we can command. Meanwhile, we shall lose no opportunity of keeping your labours before the public eye, and I shall make a point of getting up the paper for the Linnean from your materials which you are anxious about, and present it in your name altogether. Your collections are nearly all arranged in the Herbarium, and are being poisoned as they are entered. It is impossible to exaggerate their value."

In regard to the publication of an Australian Flora, to undertake which both Sir William and Dr. Hooker had been so anxious to induce Mueller to proceed to England, it became evident that Mueller, notwithstanding their advice and wishes, was not able to accede to the oft-repeated request. Probably the Colonial Government was unfavourable to the project, and health reasons may

also have been an obstacle. It was considered advisable by English botanists that the *Flora Australiensis* should be undertaken without further delay; and, after much discussion and full consideration, the conclusion was arrived at that Mr. George Bentham, the distinguished botanist, should be asked to prepare the Flora, and Dr. Mueller to collaborate in the great work.

This decision, the force of which Mueller, at the time, could not so well understand, when viewed from an Australian standpoint, was communicated to him. Naturally, it was not readily accepted when he saw that the cherished project, to which his labours had been for some years definitely directed, would, in great part, be entrusted to another to carry out to completion.

Little information as to the actual discussion during this period is available; but, in the end, Mueller seems to have been reluctantly convinced by the arguments and representations of his English friends to agree tentatively with the proposal.

Bentham had hoped to start the work in 1859, but tardiness in agreement among the Colonial Governments in Australia had delayed operations, so that it was not until 1861 that a definite decision was made. Bentham explains the situation in the following letter to Mueller:

My Dear Sir,—

Kew, May 16th, 1861.

You will see by the annexed copy of a letter I addressed some days since to William Hooker that the question as to whether I am to be entrusted with the preparation of an Australian flora now depends entirely upon the immediate decision of the Colonial Governments themselves. Our Colonial Office here took up the project very eagerly, and the work would, I have no doubt, have been commenced two years since with or without the colonies themselves, had it not been for the desire some of them showed that there should be splendidly illustrated Floras, conducted on the scale that you have begun for that of Victoria, which, independent of the diminished use they would be to European botanists, travellers, and temporary visitors, would require far too much time and cost in their preparation for me to think of undertaking. Even now the Duke of Newcastle seemed anxious that the Australian flora should be the next of the floras to be carried out on the general plan but the Treasury have definitely declined to sanction it under the circumstances. The question now is whether the colonies are really desirous of having the work done, and I will still keep my engagements open until the end of this year. If, by that time, I do not receive the necessary authority, I shall be obliged, although with much regret, to give up the idea altogether, and enter into further arrangements for the Brazilian flora, of which I have already done the Papilionaceae, and for which Martens pays liberally.

Should I receive the commission, I must depend a great deal upon the continuation of the assistance you have always most

liberally furnished in the way of specimens or notes, and which I should always take care most fully to acknowledge.

I always make a rule to adopt MS. names, when not debarred by the rules of priority, or by mistaken delineation. As you will observe in the Hong Kong flora and other works, when the MS. names of Champion, of Spreng., of Mertens, etc., are always given without adding my own name, for *Champ. et Benth.* would serve to lengthen uselessly the quotation, and I do not in the least care to have my abbreviated name tacked on to the greatest possible number of species, as has not infrequently been the case with botanists who have no claim to it as discoverer.

Immediately on receiving the authority, should it be so decided, I shall commence with the *Thalamifloræ*, and much is already done. As far as regards genera for the *Genera Plantarum* which Dr. Hooker and myself are preparing, and of which we hope soon to send the first parts to press, I should be very glad therefore, if I am to go on, if you would communicate as early as possible any specimens, notes, and printed accounts you may have relating to *Thalamifloræ* and *Leguminosæ*, which I presume will fill the first volume.

I send you by this post a copy of my *Flora Hong Kongensis*, which I beg you to accept both as a token of my great regard for you, and as a specimen of the manner in which I should propose drawing up the *Flora*.

I am happy to hear that your name is on the list of the Royal Society this year. I believe there were more than 40 candidates, out of which only 18 could be elected. It was, however, I hear, unanimously admitted that none had better claims than yourself.

Believe me,

My Dear Sir,

Ever yours sincerely,

GEORGE BENTHAM.

From this letter it may be seen that Bentham was awaiting the ratification by the Australian colonies of the proposal that he should undertake the work on the lines indicated, and also that he felt assured of Mueller's approval thereto, and of his active co-operation in the production of the *Flora Australiensis*.

It would seem, however, that the trio of English botanists had taken Mueller's complete acquiescence in the project too much for granted.

Still unconvinced that any insuperable obstacles prevented the production of the work by him in Australia, he had already written a letter to Sir William Hooker, making out a strong case for such a course, and urging his undoubted claims for being entrusted with the preparation of the work.

This letter, received only a few days after Bentham's letter of May 16th, had been sent to Mueller, caused great perturbation. Sir William showed it to Bentham and Dr. Hooker. The former immediately wrote again to Mueller as follows:

Kew, May 22nd, 1861.

My Dear Sir,—

Since writing to you via Southampton the other day, I have seen your letter to Sir William Hooker, in which you seem to think the Australian Flora ought to be left entirely to you. I am perfectly aware of the indefatigable zeal and industry you have shown in the investigation of the vegetable productions of Australia, of the high scientific ability you have shown in the varied and numerous botanical papers you have published; and that, could you come over to this country for the purpose, no one could nearly so well as yourself prepare the general flora that is so much wanted. Yet, at the same time, I feel also that to be satisfactory to the Botanical world, it must be done in this country, for nowhere else can the old species published,—the collections of Brown, Cunningham, and others be verified—and nowhere can the Tropical Australian Flora especially be properly elucidated with a comparison with that of tropical Asia and Oceania; and this I always considered the view you took, when in your letters to myself as well as to the Hookers, you kindly expressed yourself so well pleased that the preparation of the flora should be entrusted to me.

It appears to me that it would far more contribute to the advancement of science as well as to the maintenance and furtherance of the high botanical reputation which you already possess if you were to devote yourself to the completion of such work as the splendid flora of Victoria which you have commenced, and which cannot be done without the knowledge of the living plants and other advantages which you have—and if you were likewise to continue giving to the world the descriptions of the numerous additions which you have made to the botanical treasures of Australia; whilst, if you were to give up all these for the purpose of condensing the whole flora of your continent into a few octavo volumes you would find it both a hopeless and a thankless task to accomplish without these aids which our Herbaria afford.

As for myself, I cannot but feel that my position has given me peculiar facilities for the task; and, since it was proposed to me to undertake it three years ago, I have been in many ways preparing myself for it, and I feel fully confident that, if my health and faculties do not become impaired by age, I shall easily get through a volume a year as I offered to do; and I think that such a work got up in this country, in which your contributions would be fully noticed, joined with the publication of your Victorian flora and other works, will spread far more widely the reputation you have so well earned, than were you to devote your time to the work of compilation, which would be much retarded by the necessity of frequent references to Europe, where it would be very difficult to find persons competent to compare your specimens and solve your doubts, except among those who have too many other occupations to devote themselves to the task. Having said this much, I leave the matter in other hands. The offer to undertake the task having been made to me, and accepted by me, I feel loth to give it up; but, as I said in my former letters, years are now coming on, and either I must at once commence it or give it up entirely.

Every yours very sincerely,

GEORGE BENTHAM:

This letter contains a dignified and reasonable statement of the position. Two days later it was followed by a letter from Dr. Hooker from Hetcham, Ipswich, May 24th, 1861, in which he writes:

My father and I are much concerned to find that we are now again at cross purposes with you upon that subject.

In regard to the authorship of that work, our only desire is to see that it is done well by whoever by position and attainments, is the best qualified to do it well. Now, putting attainments out of the question, it must surely be evident to you that to work out the Australian Flora without references to the collections of Brown, Cunningham, Drummond and the Paris Herbaria would be a proceeding that no botanist could approve, and from which indeed I should have thought that most botanists who regarded the interests of science and the rights of collections as paramount, would have shrunk. Indeed, we all congratulated ourselves that you had entertained the same opinion of Bentham's fitness that is universal in Europe, and we certainly so understood from letters to himself, to my father, and to me, in which you joined us in thinking that it was a matter of congratulation to botany that a man who is of all others the most skilful and accurate in Descriptive Botany, should undertake a task that called for so eminent a display of these qualifications. There has been no desire or wish in this country to disparage your labours, either as traveller or botanist; indeed we have fought hard enough for you in every way, but we are not going to lose sight of justice to your predecessors, whose claims you naturally think so lightly of, in comparison with your own, because in your isolated position you cannot avail yourself of them, or feel or know the opinion that is formed of them in this country.

It would be of little use to point out to you the difficulty of the efficient construction of so gigantic a Flora as that of Australia, how much tact it requires to seize prominent characters, and to make diagnoses, both brief, diagnostic and accurate, in doing which Bentham has had 40 years' experience, and you none; and how much advice and counsel the wisest and best botanists amongst us take of one another in all these matters, before arranging a plan that is to include 8,000 species, so arranged and described as to be really useful and not troublesome. All this, I affirm, requires work of a very different character from that you have been accustomed to, and hence for systematic methodising that you have never felt called upon to exercise. I will tell you candidly that excellence in these matters requires deep, long study and thought, without which Bentham himself would never have obtained even mediocrity; for my own part, I feel wholly unfit to cope with him, and would not attempt any extensive Flora that he would—under any circumstances; nor do I see how you could do the work with care within a reasonable period. Bentham, who has nothing (or little) else to do, works all day at Kew and then with Flora the most familiar to him. He rarely describes more than five species a day, including all arrangements, comparisons, and genera, etc.; and he calculates that the Australian Flora would take him seven or eight years at least to do it so that his work should last, and the book be a standard for all time.

With your multifarious duties, and such a work as the Victorian Flora in hand, you would, I am sure, find it impossible to do the Australian well.

Candidly, then, let me assure you as a friend, that in the opinion of your best friends here, circumstances are against you undertaking the Australian Flora, far more than against mine even; and I had for many years set my heart upon it, too, but I have abandoned it long ago in favour of Bentham, because I have no time to do it justice, and because it would be a public calamity if it were taken out of his hands.

From Kew on July 14th, 1861, Dr. Hooker again writes:

"He (Bentham) has written to you about the Australian Flora, and I do hope that you will see the expediency of the course he proposes—it is no fault of yours that you are not in a position to publish such a Flora, nor that you have not had the experience in general botany that is so essential to drawing up short accounts and diagnostic descriptions. Your election to the Royal Society will, I am sure, convince you that every one here is duly anxious for your fair fame, and appreciates to the full your admirable labour. Go on publishing your materials by all means, and above all things do give us an Index to all your species with references, etc., we often waste hours over your works for want of a key to the whole."

Mueller was undoubtedly mortified and disappointed in his ambition, but the strong recommendations of his friends and the realisation of the difficult position he would be in if he persisted in his desire to publish the Flora from Australia had their effect.

In the latter case, there was not only the cardinal disability of remoteness from the repositories of other botanists' work which were indispensable for verification, comparison, and elucidation of species and genera; but there was the deprivation of the Colonial Office's interest and support in the undertaking; whilst the comparative indifference to the project in Australia, and the much greater cost of the work as a whole would have been obstacles greatly hampering its success. Added to this there was the risk of losing the invaluable assistance from the Hookers and Bentham, and of a possible estrangement in friendly relations.

Dr. Hooker's plain presentment of the case seems to have convinced Dr. Mueller even against his will, of the advisability of sacrificing his private inclinations and agreeing to the scheme proposed as being in the best interests of botanical science. Henceforth, although the disappointment was never forgotten, and a feeling of *outrage* remained, which sometimes found utterance. Dr. Mueller, as Bentham freely acknowledged, assisted un-

sparingly and loyally in the development of the *Flora Australiensis*, a great work which Bentham could not have successfully produced without Mueller's valuable and continued assistance.

In reply to Mueller's intimation that he would accept the proposal, a determination that relieved the tension of a difficult situation, Dr. Hooker wrote as follows:

Kew,

September 22nd, 1861.

Dear Dr. Mueller,—

We have all been extremely gratified by the liberal spirit in which you have met the wishes of your friends here with regard to the Australian Flora; and Bentham and you may depend that we shall make every arrangement for the fullest and most prominent acknowledgment of your Herbarium, name, services, etc., and in the title-page and throughout the body of the work.

Do you know I think you very wise to give up the idea of writing an Australian Flora in Australia. Whatever the extent and value of your collections, granting even that they were greater than ours, still to have published such a work without reference to the collections of Banks, Baudin, Freycinet, D'Urville, Brown, and Cunningham, would have brought an amount of criticism upon your work that it would never have recovered from; and, indeed, I feel positive that you would have become dissatisfied long before its conclusion. Nor have you, I am sure, any idea of the time and labour required, for it is a task that I should well have liked; and for which I have much more preparation than anyone in Europe by the study and arrangement of all our Australian plants here, in the Linnean, etc., and many of those of British Museum; but I shrink from the task which would be incompatible with my other work.

By the way, we cannot allow you to be at the expense of sending your Herbaria backward and forward, we shall pay one way at any rate. I shall see that we add to it scraps of all the species it wants wherever they can be broken off, so as to make it as complete as possible before returning.

I am extremely glad that you are going on with the Victorian Flora;—it will do you a very great deal of credit in every way. It will be a standard work as long as Botany remains, and must be so whenever an Australian Flora must have been superseded, and thereafter rejected.

The public must always know that no man can be so qualified as you for the Victorian Flora, that you have all materials, original views of the descriptions and species and thorough competency;—improvements and discoveries may follow, but it must always be standard, and can never be superseded. It is a work of a widely different and in most respects of a much higher order of merit than the Flora of Australia from its thorough character.

The Flora of Australia will be at best an imperfect sketch. No genus can be worked out as you do a Victorian one in the Victorian Flora, and its greatest value in our eyes will be derived from its working up the collections of the last century into a systematic form, and wiping off the stain upon our science which has been left through our neglect of the collections of Banks, Brown, etc.

Ever most truly yours,

JOS. D. HOOKER.

Mr. George Bentham was no less relieved at Dr. Mueller's change of attitude, and in a letter from Kew, dated October 15th, 1861, writes:

I lose no time in expressing to you my gratification at the liberal manner in which you have met my proposal relating to the Australian Flora, a further proof of your well-known zeal for science, and of the disinterestedness of your labours in the investigation of the botanical treasures of the Australian colonies. I have no hesitation in acceding to the stipulations contained in your letter, and I accept thankfully the loan of your standard herbarium in successive portions on the proposed conditions.

With regard to the title-page, upon consulting with Sir William and Dr. Hooker as to the most suitable mode of meeting your wishes, we propose to draw it up as follows:—

Flora Australiensis.
A Description
Of the Flowering Plants and Ferns
Of the
Australian Colonies.
By

George Bentham, President Linnean Society.
With the Assistance of Notes and Descriptions
Communicated by

Ferdinand Mueller, Ph. and M.D., F.R.S.,
Government Botanist of the Colony of Victoria.

Director of the Botanical and Zoological Gardens of Melbourne.
Published under the authority of the Colonial Governments of . .

The answers already received to Sir William Hooker's application to the Governors of the several colonies appear to be so far satisfactory as to leave little doubt that the requisite funds will be forthcoming, and I shall immediately proceed with the preparation of the work.

I should therefore feel obliged if you would, at your earliest convenience, despatch the first portion of your Herbarium and notes—that is, the Thalamifloræ, including those Calyciflorous families which in de Candolle's Prodrômus, precede the Leguminosæ, as these orders must be worked up with the Thalamifloræ.

From Kew again on November 16th, 1861, Bentham wrote:

I sent you, in my last letter, a sketch of the proposed title-page for the Flora. I forgot to add that I should, of course, explain fully in the Preface the part you will have taken in the work, and hope to do full credit to your zeal and success. What I am most anxious for as soon as possible is the printed sheets of your Victorian Flora—notes on localities and habit of species not comprised in that Flora, and the loan of specimens of those species of which you have not hitherto sent in specimens—all for the families above Leguminosæ, which, as you say, will probably fill the first volume. The second volume will include the terrible genus Eucalyptus, which, perhaps, might be worked up by you with notes that I might add from comparison with specimens published in Europe; and what I should suggest as most conducive to the general purpose, would be your proceeding as rapidly as possible with your important flora of Victoria so as to keep well ahead of me.

He speaks of the importance of noting the geography of habitats to show plants belonging to the divisions, North Coast, Queensland, New South Wales, Victoria, Tasmania, North Australia, etc., and invites suggestions for consideration in regard to this or any other topics.

From this correspondence it is evident that it was the unanimous opinion of the Hookers and Bentham that Dr. Mueller was the one best fitted for undertaking the comprehensive work of an Australian Flora; that it could not be effectively carried out except in Europe, where free access to previous botanists' collections was indispensable; that Mueller, although repeatedly besought to go to England and undertake the work, and assured of every assistance, was unable to go; and that, in default George Bentham was asked and agreed to produce the work with Dr. Mueller's active assistance.

A satisfactory understanding having been arrived at between the parties interested, constant communication between Mueller and Bentham took place up to the completion of the work. In some matters it is not always quite harmonious, but is generally frank and to the point. When the waters are somewhat troubled, Dr. Hooker tactfully pours the oil of counsel and good sense on them, his influence with Dr. Mueller being very great.

In a letter dated 24th March, 1862, Bentham acknowledges the receipt of a letter announcing the despatch from Victoria of the first consignment of plants from the Herbarium: "I will not allow another mail to pass without thanking you for all you say as well as for yours of 24th January. I will take care to attend to and consider well all your suggestions; and, if I do not discuss them at length with you," it is because there is no time for long letters, the *Genera Plantarum* and work entailed on it, the detailed examination for the *Flora Australiensis* and minor botanical papers and affairs absorb all his time.

Bentham states that he works five and a half hours every day at Kew and two and a half hours at home, and has the evening for necessary quiet and social enjoyment. In preparation for the Flora, whilst awaiting receipt of Mueller's specimens he has been checking and examining genera and species in detail. "On receipt of your specimens," he writes, "I shall go regularly through the Flora, beginning at the beginning; and, when not taken away by other matter I find I can readily get through 30 or 40 species a week."

He goes on to say, "As to the limits of genera and species, the longer I live, and I have now worked at them

for eight and thirty years, the more I see how little fixity there is in them, and how impossible it is that botanists' views should agree upon them. In writing a systematic work one must make up one's mind on the spot, often upon insufficient materials, and often must take into consideration the opinions of others against one's own. I say this because it is inevitable that on many occasions I may unite or separate species in a manner you may not approve, just as in other works I have published, botanists whose opinions I value more than my own disagree from the conclusion I have come to; therefore it is that I have always declined joint work, unless, as in the case of Dr. Hooker, I can daily and constantly discuss with him. I am anxious to give every credit to those who kindly assist me; and in the Australian Flora, I am particularly desirous that you should be satisfied with what I say on the subject, but I expressly wish to have the sole responsibility, so that neither you nor anyone else shall be committed by what I do."

(To be continued.)

BRUSH-TAILED RAIDERS.

The Greater Brush-tailed Pouched Mouse, *Phascogale penicillata*, the largest species of a very interesting genus, appears to be increasing, though it is not common, in some parts of Victoria. Lately I have received notes concerning it, from several localities, including Toolangi and Ruffy. It is described, in each case, as a raider.

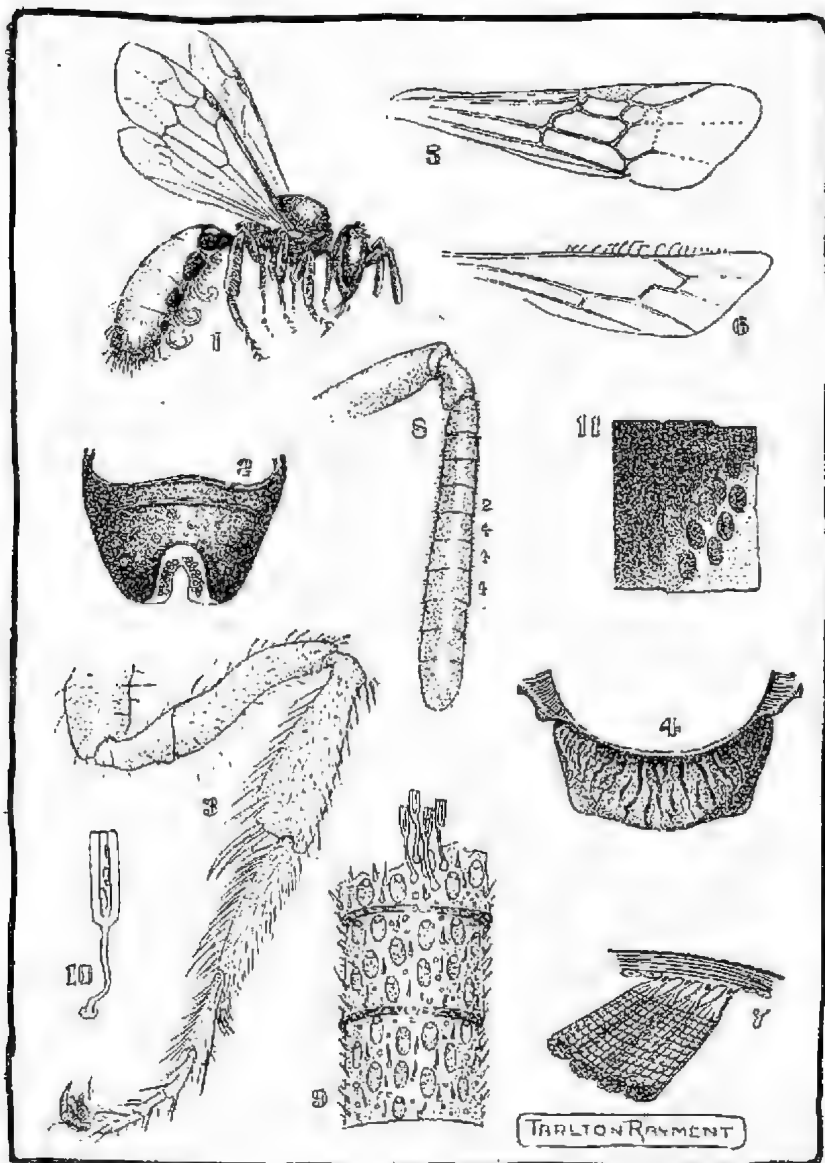
Writing from Ruffy, Mr. G. H. Noye says that, some time ago, a strange animal, thought to be a "squirrel" of some kind, was seen once or twice, very early in the evening. It would "skylark" over the ceiling, at night, running races with itself in great style. Outside, glimpses of it were obtained, as it scurried about in a large Paradise tree, displaying a long, bushy tail. It would, after romping, remain perfectly still for a while, almost crouching on a bough.

Canaries and goldfinches in an aviary often were disturbed at night; and eventually a canary was killed, and drawn piece-meal through the fine mesh netting. Another bird lost a leg; a third suffered injury to its head. A rabbit-trap was set near an opening in the roof, where the raider was supposed to live, and next morning a Brush-tailed Pouched Mouse was found, dead, in the trap. These animals, Mr. Noye remarks, are not numerous in the Ruffy district. They prey upon insects and small birds.

Recently a *Phascogale* of this species was captured in New South Wales, and sent, alive, to Taronga Park.

Country members are invited to send notes regarding any of the smaller marsupials inhabiting their districts. Of the habits of some species we possess very little knowledge—C.B.

Plate V.



A NEW HALICTINE BEE.

HALICTUS PLATYCEPHALUS, Sp. n.

BY TARLTON RAYMENT.

† Length about 4.5 mm.; black; head large, broad; frons shining and excessively punctured; Clypeus prominent, convex, coarsely and sparsely punctured, well covered with white long plumose hair, the apical half of supra clypeal area pointed upward on a median line. Antennae of normal length, submoniliform. Mesothorax shining, coarsely well-punctured, but not so excessively as frons; a lin. objective reveals some minute striae radiating from each puncture; a few scattered white hairs. Scutellum sparsely punctured. Area of metathorax small, shining, with coarse anastomosing rugae, a few white hairs near pleura. Abdomen broad, shining, excessively punctured, hind margins of segments narrowly and obscurely fulvus; the hind margin of the second segment has an unique single row or fringe of minute, stiff, white plumose hairs; the longer scattered white hair is most conspicuous at sides. Tegulae piceus with pallid margins. Wings almost clear; stigma and nervures dark ferruginous; second recurrent and intercubitus very faint. Legs black, except tibiae, with light ends, and tarsi ferruginous. Tibial spurs pale yellow, with one tooth and three nodules beyond.

The species frequents *Olearia ramulosa* and *Goodenia ovata* during February. The large head, striae and black tegulae at once distinguish it from *H. unicolour*.

KEY TO PLATE (V.).

A few details of four Halictine Bees of Port Phillip.

1. † *Halictus raymenti*, Ckll.; note the curled hair of the abdominal pollen-brush or *scopa*.
2. Nodules on the hyaline margin or *rima* of fifth dorsal abdominal plate. The furrow is characteristic of the family.
3. Hind leg of *Halictus tarltoni*, Ckll. † Note the faint recurrent nervures.
6. Posterior or hind wings of *Halictus tarltoni*, Ckll. † Note the weak hooklets.
7. Portion of striate wing-muscles attached to the inside of the mesothorax. Note single row of epidermal cells.
8. Antenna of *Halictus intermedia*, Raym., showing the "joints" on which new organs were found. The figures indicate the number on each.

9. Surface of antenna, highly magnified, to show the sense pores, the "pegs," and four of the new organs.
10. New organ, highly magnified.
11. Portion of fat body of *Halictus raymenti*, showing the numerous oil-globules in the fat cells.

Nota bene.—I suggest that this organ be known as the *detectum*, and that its function is the detection of sound-waves. Transverse and other micro-sections will be obtained when more material is available in the Spring.

OPEN-AIR PLANT MUSEUM.

How Wilton's Bush, or the Otari Native-plant Museum, came into the hands of the Government, which constituted it a scenic reserve, and how, later it was acquired by the Wellington City Council, partly by purchase, is told in an article in the *New Zealand Journal of Agriculture* (May, 1927).

The area occupied by the Museum is 143 acres—one half of which is practically in a virgin state. The plan upon which the museum is to be arranged is: (1) A study of the flora from the systematic biological sides. (2) The vegetation. (3) Horticulture. (4) The restoration of the forest. "It must be clearly understood that the flora and the vegetation of a country are two quite different things. The flora is concerned with the species merely as species; but the vegetation with the combinations of species as they grow side by side, such combinations taken all together, making the plant covering of the land."

Examples are to be made of various important features of the primeval vegetation of New Zealand—this is an unique undertaking—full of possibilities for the good of the people. Indeed, as the flora and vegetation of New Zealand are considered of special interest the world over, the influence of the Otari Open-air Museum will be world-wide.—P.F.M.

EXCURSION TO SHERBROOKE GULLY.

Sixteen members and visitors attended the excursion to Sherbrooke on Saturday, July 9th. In Clematis Gully, the Lilly-pilly tree, planted on the occasion of the Club's last visit, was seen to be thriving. This gully is one of the finest in the Dandenongs. The party proceeded to Sherbrooke by way of the track cut on the southern slope of the hill.

On the margin of the forest, close to Sherbrooke, a Lyre-bird "colony" was visited; and several of the party had a good view of a full-grown bird, traced by its calls. Other members went to the kiosk, where they divided, and followed the sounds of Lyre-birds in various directions. During the afternoon several more birds were seen, and a dancing mound near the kiosk.

The dampness of the day rendered it well suited for an excursion of this kind, as the moisture appears to bring the food supply of *Mennira* towards the surface, and the birds generally are active in their search among the leaves and mould; and noisy in their enjoyment of the hunt on days such as this. A pair of Funereal Cockatoos and many smaller species of birds were seen.—A. G. HOOKER.

THE SAND-HOPPER BEES.

BY TARLTON RAYMENT.

You will remember that the maker of fine purses, the wild-bee, *Euryglossa*, dwells on the very face of the cliffs which hem in the waters along the eastern shore of Port Phillip Bay. This natural wall, then, receives the full brunt of the broiling summer sun.

In winter, the spray and spume from the sea sweep up over the cliffs in misty gushes that follow each other in irregular succession as determined by the caprice of the wind. The ferocity of the "weather" erodes all soft soil, and, as I have already described the cliff-bees love the naked escarpments that are as hard as sandstone.

But the honey-gatherers that I now wish to talk about are the "Sand-hoppers," *Halictus victoriellus*,* Ckll., that shun the exposed positions, and never seek the cliff-face, with its alternate heat and cold and wind. They nest in the top, in the shelter of the dense 'Tea-tree' and Coast Wattle.² There the ground is clad with the golden-flowered Capeweed,³ the "Boobialla,"⁴ and also much green verdure, including a kind of sweet-smelling wild Spinach. There is, too, the yellow flowered *Melilotus* in abundance.

In through the beauty of the unique Tea-tree growth, wind narrow paths that are firm enough when wet, but which in dry weather soon tramp into a light-grey loose sand. Picnic parties from the city roam over the coast, especially on holidays, and the paths become as soft as dry flour, so fine are the grains of quartz.

When the top of the ground is damp it is dark in colour, almost black, and I think the sombre hue might be explained by the decaying of the vegetation that crowns the cliffs. I am curious, and scrape away some of the black top-land for a few inches until I uncover a thick stratum of white sea-shells, all of which lie flat; never an one on edge. Then a thin layer of charcoal-like debris, which is very black indeed. Then more bands of shells and charcoal, perhaps for three feet down. The lime is soft, and crumbles quickly between my fingers; it may have been burnt ages ago, when fingers blacker than mine picked out the tasty morsels from the freshly roasted shells.

*This species is very close to *H. pulvitectus*, Ckll., recorded from Tasmania.

1. *Leptospermum laevigatum*.
2. *Acacia longifolia*, var. *sophorae*.
3. *Cryptostemma calandulaceum*.
4. *Myoporum insulare*.

However, the old residents of the shore tell me that the aborigines were accustomed to congregate along the grassy places, to perform certain rites that included the cooking of shellfish from the near-by rocks. There are large areas of alternate layers of shells and burnt debris, and the corroborrees must have been spread over a very lengthy period to account for such a huge deposit. Of this I am sure, where the burnt matter is uncovered the ground is very dark.

It is all very interesting, and the problem is worth investigating, but my paths are sharply defined, though in places are right in among the Wattles, so that I get brushed with the foliage as I push through. Now, I have walked these winding tracks for years, and I possess sharp eyes, but I had many disappointments before I found the nests I sought.

It is a spring day in September, and I am fortunate—also patient, and I lean one arm on a bent tree-limb to rest and observe at length.

I am rewarded.

You see, it is yet too early for the summer visitors to tramp the friable ground into flour, and right at my feet I perceive many dozens of tiny grey-black bees fossicking for a shaft-mouth in the centre of a cone of loose sand. These do not find their home sites quickly, though they search diligently over an area of a foot or so. They then dive suddenly into a cavity close to a grass-root. They are females, loaded heavily, either with Cape-weed gold, or else the cream pollen of the pink "Pigface." One searched the tiny pink funnel-flower of the Onion-weed.

Fortune often comes with a lavish hand, and though I have spent years in unsuccessful search, here are nests in abundance. Fabre said that his untiring patience certainly deserved a reward, consequently, he reaped his harvest. Am I any less entitled to succeed? Three years of honest peering into banks of sand, of clay, of sandstone, of loam, under grass roots, in amongst the tangle of the Wattle and the Tea-tree, under the clear blue—the intensely blue sky, the summer sun, in the chill autumnal wind, as the spring showers came sweeping across the purple blue of the Bay.

And success kept ever hovering ahead, just beyond my grasp. To-day fortune comes and spreads her gifts in a stream from her overflowing cornucopia. The nests of two long-sought species are right at my feet, while I stand idly resting.

Close at hand are a few nests of another species, one almost as huge as the Honey-bee. It is an Australian *Paracolletes*, but though I have often caught these bees I had not previously identified the nests. I shall rectify the omission.

The collection of bees in Melbourne's Museum is a limited one and many are unnamed. My collection will have to be forwarded to Professor Cockerell, of Colorado, U.S.A., for identification. No entomologist has taken up the study of the life histories of the Australian bees, so that I find myself bereft of all companionship. I look up Froggart's book on Australian Insects: "Nothing is known of the habits of the Australian *Halicti*!"

To-day I notice quite a number of females searching among loose sand, and some succeed in finding the mouths of the shafts. Since the excavated material is formed into a mound, and is very loose, I do not know if these bees cover the entrances to conceal them, or whether the loose sand just drifts over the hole with the lightest zephyrs that blow. However, most of the entrances are closed at one period or another.

The tunnel is not lined in any way, and although I saw a few pollen-laden females pass in, I could not find anything other than a number of pupae cases, each a little over a quarter of an inch in length, probably of some fly. I brought some home to mature, but I do not think at present these are reared on the bees' stores. Six to eight square feet are occupied by the bees' nests, and while I was unable to discover a pudding or cells, I did find plenty of pupae of a brownish-pink colour, and one pupa of a very dirty yellowy white, the abdomen being pinched into a point at the end. They were found about 9 inches down, and scattered through the earth. [Later these developed into large flies that have no relationship with the bees' nests.]

The October days are very fine, and I visited my bees every day. Sometimes all of the shafts were closed with loose sand, and since there is always much foot traffic, I am again unable to say whether the closing is due to human feet or to those of the insects. I attempted to dig one out, but it went down over twelve inches, and owing to the looseness of the ground I was unable to follow the burrow any deeper. Moreover, I do dislike digging under the scrutiny of curious people, passing visitors, and employees of the municipal council.

The head-gardener is a good friend of mine, so that when I am rewarded with a glimpse of a wild-bee's nest

in the loose sand of his flower beds, I say, "Will you please let me know when you wish to dig this bed. That tiny black hole is the mouth of the shaft that leads to the nursery of a wild-bee. I want to study it." The gardener plucks a near-by twig and thrusts it into the ground to mark the nest.

My notes read: October, 9th day, and it is blowing "great guns" from the north, and though it is yet spring, it is a dry devastating wind that turns all the Cape-weed heads to the south. Not a single honey-gatherer is to be seen, and I am dismayed. It is a most uncomfortable day. True, there is no dust such as is drenching the inland northern suburbs of Melbourne, but the Tea-tree wrenches at the soil, and the flowers suffer intensely. The water is calm inshore, as the breeze is off the land, but out a mile or so there is a white-capped cross sea.

I said there is not a bee in sight, and the Sand-hoppers have almost every entrance closed. Of course, the wind could do that quite easily. I have a spade with me to-day, also a strong knife and a length of white string.

I blow away a patch of loose sand, equalling the area of a half-penny, and uncover a tiny black aperture. I then pass down my thread as far as it will go, and find that eight inches is all that I can plumb. You see, the soil on the cliff-top is so friable that fine, tinned wire encounters but little resistance in the soft ground, so that it will disappear in any direction, and when I attempt to follow it down, why! I astonish myself by delving clean away from the bee's shaft, finding nothing at all.

I pass down the white string, which shows in dark contrast to the dark soil. The next operation is to sink, say, eighteen inches deep at the side of the shaft. I then bring into play my knife, and carefully pare away slice after slice of earth until I uncover my white, guiding thread. The removed material drops away, and does not bother me by falling in and obliterating the object of my search.

Down I go, very carefully indeed, for as far as I can discern, there is absolutely no lining to the shaft, which drops away obliquely. I must be particularly dexterous, or I may damage the ———! I am at the bottom, where the shaft turns, and terminates in a tiny chamber about a quarter of an inch in length.

There is no sign of any bee. The inside of the chamber appears slightly darker than the surrounding earth, as though it had received the very thinnest coating of some liquid, that had dried, just a fraction harder than the

original ground. In the room is a solitary orange coloured pudding, about as large as the head of a match, or perhaps a little smaller. It is wonderfully smooth, and has just a suspicion of shininess; it is very firm, and seems to be softer on the outside. It is undoubtedly of Cape-weed pollen, for that is the only plant at present in bloom. Indeed, there is no other local plant that yields similarly bright granules, if we except the "Flat-weed," *Hypochaeris radicata*, a dandelion-like flower that is at its best in autumn.

I decided that the mouth of the shaft led to the Sand-hopper's nest because I detected a few Cape-weed granules that had been scraped from her legs by obstructing grass stalks, and that reminded one of how the sheets of perforated metal—used by the commercial apiarists to confine the queen to the brood-chamber of the hive—scrape off much of the Honey-bee's load as she struggles through the zinc barrier. I have seen quite a heap of the vari-coloured pellets of the precious meal lying about the doorways of busy colonies, and I have always opposed the use of "queen excluders," if only for the reason that they caused a serious loss of food, to say nothing of the bees's time and energy.

However, being aware of that effect on the Honey-bee has often helped me to discover the entrances to the Sand-hopper's nests. Some one may take me to task for my choice of this name, so I will tell you how I came to christen this bee.

When I found the first colony, the holes were spread out over an area of about five square feet, and it was interesting to watch these bees "flip" down, remain perfectly still for a moment, then "flip" again, when they alighted a foot or so away. It seems that this bee does not settle close to its shaft, but makes several attempts before being successful, so that a number are alighting while others are taking wing; they appear to be hopping instead of flying.

This is especially the case when they are well dusted with golden pollen. Should the bees have no granules, they are more difficult to see, for they are as dark as the grey of the soil; moreover, they are small in stature, for the length is about a quarter of an inch.

In the centre of a small, ovoid chamber is the pudding of the Cape-weed pollen kneaded with honey. It is beautifully round and smooth, and is without blemish, like a polished lentil. In one nest I find a larva on its cake. The baby bee is only 1-16th of an inch in length,

and must be only a few hours old, for, even with a magnifying glass of 24x power, I can discern no mark on the shining smoothness of the store.

How lucky! here I am holding in my hand the little cave with its pudding and feeding larva, and what an opportunity to study its development. You see, I want to place this in a glass tube, darkened with a black photographic paper sleeve, so that I may determine the time taken to eat the store, the weaving of the cocoon, the period of metamorphosis, and the season when the imago emerges. Then there is the sex to be considered.

While I am preparing to carry out my plans, the wind howls round to the south-west and down comes a drenching shower. The tiny pudding rolls over in my hand—???. I say some hard things, for the soft larva is crushed into a speck of moisture. The rain pours down, and I am soaked; but I cannot leave the place without filling in the excavations, for someone would be sure to fall in, and perhaps break a limb. In any case, the municipal authorities, who are not nature students, would most assuredly prosecute me if they witnessed my digging, so I must stay and make things "ship-shape" again.

But I am cold and wet, also hungry, and predisposed—just a little—to bronchitis, so I hurry home as fast as I am able while laden with a spade, specimen tubes, and other impedimenta of the naturalist's game. I am no sooner arrived than the rain ceases, and the sky is once more clear and blue. That is the typical spring weather of my coast line.

There is one point that prompts me to refer again to Fabre's *Halictus*. As you are all aware, his bees did not close up the cell until the larvae had eaten the whole of the store, and were about to undergo the metamorphic change. Fabre thought that the cells were left open, so that the mother might supplement the ration, which seemed scanty when compared with the supply of other wild-bees.

Of course, it might be so, for *Apis*, the Honey-bee, continues the feeding of the larvae with super-food for several days before sealing the cells, and the maternal solicitude of *Halictus* may equal that of the *Apis*.

The cell of the Australian Sand-hopper Bee is often closed for several days, and she, too, may rival the large French *Halictus* in her continued care for her family. However, many of these bees carry pollen during the whole of October, and this seems anomalous, because I find only one chamber at the bottom of the shaft, and the total store only amounts to about three Honey-bee loads.

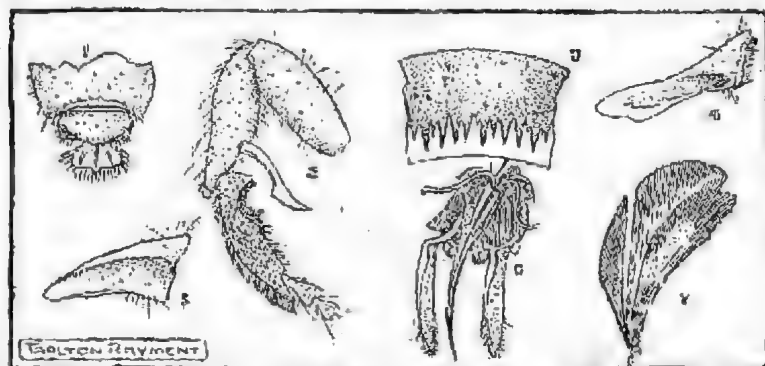
The explanation may be that only a very few trips are made during the day. In three hours I note only one voyage by this bee; then she spends an hour or two in the cell. Unlike the "Black and Tans,"* this one is seldom on "watch" duty, nor am I able to find two bees using one tunnel. Each to its own is the rule with this *Halictus*. Only rarely does she watch at the entrance; is not the grand-mother, and, in this respect, she departs from the Frenchman's bees.

I repeat, I am utterly unable to obtain more than one pudding in one shaft, but I doubt if the Sand-hopper makes more than two shafts. However, up to the closing of the nests, I do not see any males, and although there are unavoidable gaps in my observations, I feel that the mothers I saw digging and provisioning nests were a generation of females that are the progeny of a fertile mother carried over the winter in a state of hibernation.

I know of only one large Sand-hopper Bee colony, and it is so mixed up with that of another bee of very similar form that I have to be extremely careful in my observations. However, by the end of October, all the "Sand-hoppers" shafts are closed and buried beneath an avalanche of loose fine sand.

But when November opens, another generation of *victoriellus*, is digging for dear life, and I see both males and females on the Veronicas, the latter gathering fair loads of cream pollen. About the time the famous "Cup" attracts its hundreds of thousands, these bees celebrate the day by many "marriages" which all take place in the burrows.

**Halictus mesembryanthemi*, Ckll, the life history of which is given in a proposed book.



1, The beautiful labrum of *Halictus intermedia*, Raym. † 2, Portion of front leg, showing antenna brush and peg, *Halictus intermedia*, Raym. † 3, Portion of abdominal dorsal plate, showing how the coloured chitin impinges on the hyaline margin, † *Halictus intermedia*, Raym. 4, Mandible of *Halictus raymonti*, Ckll. † 5, Mandible of *Halictus intermedia*, Raym. † 6, The weak sting and palpi of *Halictus raymonti*, Ckll. † 7, The flexor muscle of the mandible of *Halictus tarltoni*, Ckll. †.

NOTES FROM THE NATIONAL MUSEUM.

THE WHITE-STRIPED BAT, *NYCTINOMUS AUSTRALIS*,
Gray.

An interesting series of the White-striped Bat was recently forwarded, alive, to the National Museum by Mr. James Hill, of Murtoa. They formed part of a large colony of nearly 30 individuals, which were found clustered in a hole at the top of a large dead Eucalypt, at Warracknabeal.

Although widely distributed over the greater part of the continent, and extending into New Guinea, the white-striped bat has not been regarded as common in this State. It is one of the free-tailed bats, the long tail projecting some distance beyond the margin of the uropatagium, or leathery membrane. The head and body are clothed with very fine, velvety, dark brown fur, the colour varying to a reddish-brown, or, in some instances, almost black.

This species, which is extremely rapid in flight, may be readily distinguished by the presence of a pure white stripe on the under-surface of each wing-membrane, which extends on to the sides of the body, and, in some instances, over the greater part of the abdomen, forming a large, broad, white patch. The ears are large and are practically joined together on their inner margins; and the muzzle is broad and truncated with the upper lip considerably wrinkled.

In confinement the bats were very active in their movements, walking quickly on the hind-feet and wrists, with the body raised clear of the ground. While resting, they hung suspended just as frequently from the fore as from the hind limbs; occasionally uttering the short sharp squeak one so frequently hears from bats on the wing.—
J. A. KERSHAW, Curator.

THE SORRENTO BORE: A FOSSIL INDEX TO STRATA.

Probably one of the most interesting, and at the same time voluminous, pieces of work ever undertaken in the Geological Department of the Museum, has been the sampling, naming, and description of the material from the bore-cores obtained in 1910, by the Victorian Geological Survey, at Sorrento.

It is seventeen years since this work of the minute scrutiny of the richly fossiliferous deposits from the boring was commenced. Within the last year or so it was made possible to finalise these results through scientific and clerical assistance from the Mines Department. The work is now so far advanced that a large portion of it has been sent to the press. The Victorian

Mines Department will issue this report as one of the Geological Survey Records.

Sorrento is situated on the downthrow side of the Cape Schanck Fault, and in consequence, at the locality we have a vast accumulation of Quaternary and Tertiary deposits in regular sequence, from the bottom beds—Balcombian—to the surface—muds and sand-dunes. So that a bore taken on the spot is of inestimable value in giving a complete section, in consecutive order, of the marls, clays, and sands, with their accompanying faunas, which were laid down during a period of three or four million years.

The total depth of this bore was 1,696 feet, and was still in the lower Tertiary strata, with no signs of having neared the base of the series. It would be greatly to the interests of science, and also economic purposes, in regard to correlation of strata incident to oil search, if this bore could be continued.

In the report there will be embodied a summary of results, giving such conclusions that may be of use in throwing further light on the cognate subjects of the biology, geography, and lithology of the Australian Tertiaries. To give some idea of the scope of this analytical work, I have determined, in round numbers, about 10,000 specimens of the larger shells from the bore, while such microscopic fossils as the foraminifera and ostracoda, which are all mounted on type slides, number about 5,000 specimens.

This collection of fossils, obtained from various depths in the bore, comprises:—Foraminifera, Worms, Sea-urchins, Sea-mats, Lamp-shells, Bivalves, Univalves, Ostracoda, and Fish remains. They are all named and labelled, and arranged for future reference, at the Museum.

One of the outstanding features of this collection is the large number of new species present, amounting to 56. These are described conjointly with Miss Crespin, B.A., who, as an assistant palaeontologist to the Geological Survey, is specially studying the Tertiary faunas. Notes are also supplied for this report by Mr. F. A. Cudmore, on some new species of fossil sea-urchins occurring in the bore; while other F.N.C. members, namely, Messrs. R. A. Keble and A. E. Rodda, have assisted, under the auspices of the Mines Department. Mr. W. J. Parr, also a member of the Club, has, from time to time, conferred with me on knotty points regarding the interesting little foraminifera.

One feels inclined, at the end of a long-drawn out work, like the present, piously to write, as did the Rev. F. O. Morris when he finished his classic on British Moths,—"Laus Deo."—F. CHAPMAN, A.L.S.

In the garden of Mr. A. E. Payne, of Toorak (Vic.), is a young shrub, which is probably the only specimen of the kind in the world. It is a variegated form of the West Australian "Peppermint," *Agonis flexuosa*, D.C. The shrub is a little over six feet in height, having the typical drooping habit of the normal species. The leaves are smaller and narrower, and the variegation is very pronounced. The centre of the leaf is a line of very pale green, while the edges are broadly cream-white and distinctly pink tinted. The young growing tips are a rich pink, as are also the young stems. This is one of the most dainty forms of variegation that I have ever seen.

The Head Gardener, Mr. J. Blackburn, tells me that the plant originated as a seed sport, coming as a young variegated plant in a box of seedlings.—E. E. PESCOTT.



BUGONG MOTHS AND JAM.

This is the third year, in succession, in which I have observed a Bugong moth, *Agrostis infusa*, sucking jam from a glass dish on the dining table. In the first instance I did not see the insect until it had commenced feeding. It was disturbed, after about 20 minutes, only by a sudden movement of some table ware near to it.

On the second occasion the moth was seen to fly in from the dark garden. It then spent some minute or more flying about the electric light, immediately above the table, in erratic flight (apparently), and after a few dashes into remote parts of the room, landed on the table cloth at a few inches from a shallow dish of dark jam. To reach the jam it had to ascend the outwardly inclining side, and then descend the inward slope, which it did without hesitation, and at once unveiled its tongue and inserted the tip. This moth remained during 15 minutes with only the tongue moving, and then flew up to the light and soon disappeared.

The third moth flew into and about the room without approaching the light, and then behaved as the others had done, excepting that the first tongue insertion seemed unsatisfactory, and the insect changed its position twice before settling down to an 18 minutes' feast. In all three cases, folk were moving about, tableware was being removed from the vicinity; in the second case without scaring the creatures; and in the third it was actually touched and finally withdrawn with my finger and thumb, but disappointment followed a watch, for its return to the unfinished meal.

The interesting point is that these night-fliers came from the external darkness deliberately to a bright light, and were by no means "dazzled."—A.D.H.

PROTECTION FOR OPOSSUMS.

As the result of a long campaign in their favour, opossums, in Victoria, are likely to enjoy full protection for a year at least, and probably much longer. The Club has been most active in this matter, and members must feel highly pleased that its efforts have been so successful. Also they must be grateful to the Chief Secretary, Mr. Prendergast, for his humane decision against trapping, and the keen interest he has shown in the preservation of native fauna.

In future, it is hoped, before an open season is declared for any species now protected, naturalists will be consulted by the authorities. It is desirable that an Advisory Committee should be constituted. Opossums are not the only native animals that need fuller protection. It is thought by many observers of wild life, that for several years there should be no open season for ducks; and that quails should be treated as useful birds, and given complete protection.

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No. 525.

FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall, Victoria-street, on Monday, August 8th, 1927. The President, Mr. E. E. Pescott, occupied the chair, and about 100 members and visitors were present.

CORRESPONDENCE.

From Queensland Naturalists' Club, asking for supplies of flowers for their Wild Flower Show to be held on 3rd September.

From Australian Forest League, inviting the Club to nominate representatives to attend a meeting of the League on 10th August, for the purpose of arranging a deputation to the Premier in order to urge the necessity for increasing our forest reservations.

It was resolved that Messrs. A. E. Keep and H. B. Williamson should represent the Club at the Australian Forest League meeting on 10th August.

REPORT

Mr. F. G. A. Barnard reported on the excursion to Heathmont on 30th July.

ELECTION OF MEMBERS.

The following were elected as ordinary members:—Miss Louise M. Witcombe, 4 Norman-avenue, Hawksburn; Mr. Wm. Ingleby, Basil-street, Darling; Miss Rose W. Winton, c/o Y.M.C.A., 60 Russell-street, Melbourne; Mr. and Mrs. W. Hanks, 10 Holroyd-street, Coburg; Miss Myrtle Morison, 16 Young-street, Ivanhoe; Mrs. J. Ham, Pasley, Domain-road, South Yarra; Miss Z. McTaggart, Presbyterian Girls' Hostel, Gipps-street, East Melbourne, and Mr. L. A. Thomas, Teachers' College, Carlton; and as country members:—Mr. J. L. Robertson, B.A., Werribee South; and Rev. A. H. Westley, The Vicarage, St. Bartholomew's, Ferntree Gully.

GENERAL.

The President announced that the recent Natural History Exhibition had been very successful, but it was too early to make a statement as to the financial results. He considered the thanks of the Club were specially due to Mr. J. A. Kershaw for the valuable help he had rendered at the Exhibition, both as regards the ornithological exhibit, and in connection with other exhibits.

When
July 20
When?

Mr. F. Pitcher suggested that the press be thanked for their assistance in advertising the Exhibition, and that Miss J. Galbraith, of Tyers, also be thanked for forwarding plants for sale.

The thanks of the Club were extended to Miss H. Gabriel for kindly supplying refreshments to the workers at the Exhibition.

The President drew attention to the gift of a typewriter to the Club by Mr. V. H. Miller, for the use of the Hon. Secretary. Mr. C. Daley, B.A., moved, and Mr. J. W. Audas seconded, that a vote of thanks be accorded Mr. Miller, which was carried unanimously with acclamation.

The President announced that the September meeting of the Club would be held in Queen's Hall, Collins-street, when it was intended to hold a public meeting in connection with the investigation of the tea-tree on the fore-shores of Port Phillip Bay.

Mr. G. Coghill reported that a deputation had waited on the Chief Secretary for the purpose of urging the formation of an Advisory Council in connection with matters pertaining to the preservation and propagation of native fauna, and stated that they had met with a very favourable reception.

Mr. H. B. Williamson read a description of two new Grevilleas. Mr. P. R. H. St. John moved, and Mr. F. G. A. Barnard seconded, that the species be accepted for publication in the "Naturalist." Carried.

The President invited suggestions in regard to the Wild Flower Show, to be held on 27th September next, and stated that the usual Ladies' Committee would be formed at an early date.

The President drew attention to the circulars for distribution relating to the Congress of the Australasian Association for the Advancement of Science at Hobart, January, 1928.

LECTURE.

Mr. F. Chapman, A.L.S., delivered a lecture on "Fossil Hunting at Home and Abroad," illustrated by a fine series of lantern slides. The lecturer dealt with various localities noted for fossilised remains of different forms of life, many of which were depicted on the screen and explained.

EXHIBITS.

By Mr. F. Chapman, A.L.S., on behalf of National Museum, illustrating lecture on Fossil Hunting:—Leaves of *Lomatia* and *Hedycarya*, from Tertiary sandstone,

Narracan, Gippsland. Cretaceous bivalves (*Pseudavicula*), Maranoa River, Queensland. Fern (*Thinnfeldia*) in Triassic pipe-clay, Ipswich, Queensland. Leaves of the seed-bearing fern-like plant, *Glossopteris*, in permocarboniferous mudstone, Singleton, New South Wales. Trunk of *Lepidodendron*, associated with carboniferous fishes, Mansfield, Victoria. Defence spine of a carboniferous shark (*Gyracanthides*), from Mansfield, Victoria. "Pagoda Stone," *Orthoceras* (a nautiloid), from the Devonian limestone of Buchan, Gippsland. A Univalve (*Trematonotus*), with a perforated band. From the silurian of Cave Hill, Lilydale. Silurian marine anails (*Euamphalus*), from the Cave Hill Quarry, Lilydale. Straight-shelled Nautilus (*Orthoceras*) from the silurian mudstone of South Yarra. Slab of shale of Lower Ordovician age, Lancefield, showing Graptolites (*Loganograptus* and *Phyllograptus*) and Pod-shrimps (*Rhinopterocaris*).

By Mr. H. B. Williamson, F.L.S.—Specimens of *Grevillea polybractea*, sp.n., *G. chrysophaea* (F.v.M.), sp.n., described by the exhibitor in his paper.

By Mr. F. G. A. Barnard.—Flowering branch of *Acacia falciformis*, Maiden, formerly known as *A. penninervis*, Sieb., var. *falciformis*, from South Warrandyte, per favor of Mr. A. E. Opperman. Similar to an *Acacia* growing at Rushworth, not recorded in the Census.

By Mr. H. W. Davey, F.E.S.—Sea-Mouse (*Aphrodite aculeata*). The Sea-Mouse has received its generic name of *Aphrodite* on account of its beautiful iridescence, the word *Aphrodite* being the Greek name for Goddess of Beauty. The Sea-Mice are marine worms known as *Polychaeta* of the *Chaetopoda*. The back of the *Aphrodite* has a grooved channel, and through the mass of hair-like bristles, with which it is covered, the sea water is filtered. During the passage of the water along this groove, the oxygen contained in the water is absorbed by the sea-mouse, after which the water flows away down the channel and thence through an opening under the tail. From Portland.

By Mr. E. E. Pescott, F.L.S.—Cultivated specimens in flower of *Thryptomene calycina* (Stapf) and *Acacia longifolia*.

By Mr. D. J. Paton.—Two unusual forms of *Pterostylis nutans* (Nodding Greenhood), one with two perfect flowers, the other with an abnormal flower partially double.

By Miss Bolton.—Pearly Nautilus shell.

By Mr. H. P. Dickens.—Drawing of *Corysanthes pruinosa* (Hemel Orchid).

By M. C. J. Gabriel.—Various forms of marine molluscan opercula (*in situ*).

By Mr. C. H. Borch.—Three Victorian species of Cup Moth (*Limacodidae*), with cocoons, from which insects have emerged, and from which the moths derive their name; also one species from Darwin, N.T.

By Geological Survey of Victoria (per Mr. A. E. Rodda).—Fossilised portion of body and right-hand claw of crab from Longford.

By Mr. G. Coghill.—Cultivated specimen in flower of *Grevillea rosmarinifolia* (Rosemary Grevillea).

By Dr. H. Flecker.—X-ray photos., illustrating structure and functional organs of flora and fauna, etc.

FOOD OF THE LYRE-BIRD.

I have frequently been asked, "What is the principal food of the Lyre-bird?" What is it, they so eagerly seek under the dead leaves, bark, and accumulated debris, that they are continually scratching and turning over in the timber forests and gullies? To give a definite answer to this question one would have to examine the contents of the crop of numerous Lyre-birds at different seasons of the year. As this is impossible, since, fortunately, these beautiful birds are strictly protected, one must examine their feeding-grounds, turn over carefully the leaves and debris, as the birds themselves do, and make notes of the animal life found.

Data has been obtained on numerous collecting trips to Sherbrooke, Olinda, and to various parts of Gippsland. Fully 80 per cent. of the animal life found among the decaying vegetation, under leaves, etc., consist of the terrestrial amphipod, *Talitrus*; and I think one would be safe in saying that these crustaceans form the bulk of the food of *Memura*. *Talitrus* is, I believe, the only terrestrial amphipod found in Australia; and while *T. sylvaticus*, Haswell, is found all over Australia and Tasmania, a second and larger species, *T. kershawi* Sayce, is by far the most numerous in, and I think indigenous to, Victoria.

Both species of *Talitridae* occur together in many of our fern gullies, and in forest country, and may readily be distinguished, not only by their relative size, but especially by the shape of the epimeral plate of the third segment of the metasome. The average length of *T. sylvaticus* is 8 mm., a large specimen may measure 12 mm.; whilst the average length of *T. kershawi* is 11 mm., and may reach the length of 15 mm. In *T. kershawi*, the epimeral plate of the third segment of the metasome has a triangular downward projection, which distinguishes it from *T. sylvaticus*.

The *Talitridae* of Victoria were fully described by the late O. A. Sayce, some twenty years ago.—J. SEARLE.

NATURAL HISTORY SHOW.

Some years have passed since the last public display of Natural History objects was made by members of the Club. This was at the Town Hall, Melbourne.

It was considered, in order to give practical evidence of the objects and activities of the Club, that the time was ripe for such another exhibition. The Show was held at the Independent Hall on Wednesday, 20th June. The different sections represented had been allotted to members of the Club specially interested in each department of Natural History. The Show was opened by the Hon. W. Prendergast, M.L.A., Chief Secretary. The President of the Club, Mr. E. E. Pescott, in introducing Mr. Prendergast, detailed the various directions in which the Club had been actively engaged during the past year in regard to the protection and preservation of the Australian fauna and flora.

Mr. Prendergast, in opening the Show, expressed sympathy with the objects of the Club, and his desire to assist in their good work in any way that lay in his power.

There was a varied show of exhibits, and a good attendance of the public showed the interest taken in natural history. Mr. C. Gabriel, in charge of Conchology, had a very fine collection of shells on exhibition, including a case of "Thorny Oysters," *Spondylus*, from N. Australia and the Gulf of Carpentaria; an attractive case of Pectens, Australian and exotic; another of "Harp" shells; one of rare Victorian shells of various species, including *Fasciolaria australasica*, Gatliff and Gabriel, also its capsules, showing the tiny embryonic forms *in situ*, the bunch of capsules containing several dozen, with five to eight juveniles in each capsule.

Of interest also were a series of the Common Cowry, *Cypraea angustata*, Gessel., showing growth and development; bivalve shells bored by *radulae*, also microscopic slides of the borers; a large bunch of *Siliquaria australis*, G. and G., from Bass Strait, a genus frequently embedded in sponges, and formerly regarded as an *Annelid*, its molluscan nature being demonstrated by Andonin.

The ravages of the *Teredo* were shown in an exhibit of several species of timber bored through by this destructive creature, of which five species from Victorian waters were on view.

For purposes of comparison and instruction, the smallest Victorian shell, *Orbitestella hawsoni*, Gatliff, about

one-thirtieth of an inch in diameter, was shown in juxtaposition with the largest, *Livonia mamilla*, Gray, about 12 inches in diameter.

Although too early for a profuse display, such as springtime affords, there was a good show of winter blooms in the botanical section, in charge of Mr. H. B. Williamson, F.L.S. Mr. R. L. Brookes, B.A., of Horsham, sent 25 species, including *Thryptomene*, Red Heath, Blush Heath, and Desert Heath-Myrtle from Horsham and the north of the Grampians. Mr. and Mrs. Loughced, of Diapur State School, also sent about 20 species, among which were Silky Hakea and Scaly Humea. Mr. D. J. Paton showed the Coast Beach-heath, Common Correa, Myrtle Acacia, Yellow Hakea, and Coast Banksia, about 20 species collected at Boronia and Beaumaris. Mr. F. S. Hart, M.A., sent a collection from Bairnsdale, in which White Correa, Showy Guinea-flower, and Stalked Doubah were interesting features. Mr. and Mrs. Rossiter, from Hedley, sent beautiful Heath and Correa, and growing Greenhood Orchids, mosses and lichens.

An interesting and instructive exhibit of Mistletoes on various hosts—Cootamundra Wattle, Tree Lucerne, and Peach, the last from the Rev. Birch, of Echuca, was staged by Mrs. Coleman, who has been studying these pests.

In accordance with the Club's consistent policy to foster the cultivation of Australian plants, a stall with plants for sale was under the charge of Mr. and Mrs. F. Pitcher, with helpers, to which Mrs. J. Galbraith, Traralgon, and Mr. G. Higgins, Red Hill, had sent an acceptable contribution of young plants, which found a ready sale, the stall receipts being £13/5/-.

Mr. Pitcher also exhibited fronds of 23 species of Ferns gathered on a Club excursion to the Dandenongs in March, among which was *Aspidium glabella*, forming a new record for Victoria. Fine examples of the young grey-coloured leaves of the Blue Gum, *Eucalyptus globulus*, with mature leaves 18 inches in length, showed the marked heterophylly of this species of Gum.

In the Department of Ornithology, under the experienced direction of Mr. J. A. Kershaw, Director of the National Museum, an admirable and representative display of native birds was made, which attracted much observation and admiration. To this section the Bird Observers' Club also contributed specimens.

An encouraging feature of the Exhibition was a varied and pleasing collection of Natural History objects furnished by the Juvenile Branch of the Club at Mornington, which, under the enthusiastic direction of the Rev. Geo. Cox, is making, as the exhibit well showed, great progress in the departments of Nature Study.

In the Geological Section, in charge of Mr. F. Chapman, A.L.S., F.G.S., the space was occupied by fossils, minerals, microscope sections, stereoscopic views of geological scenery, and lantern slides. By the interest evinced in this section by visitors, it is evident that this side of the field study, only needs popular treatment to become more attractive. Minerals from Broken Hill, Mount Lyell and Mount Morgan were exhibited by Mr. F. A. Singleton, M.Sc., a rare Silurian air-breathing snail, *Hercynella*, found on a Club's excursion at Killara by Mr. A. C. Nilson; rock slices under the microscope by Mr. A. L. Scott; a glaciated stone from the Permo Carboniferous till, by Mr. A. O. Thiele; a stereoscope with views, by Mr. W. H. Harvey; and a fairly large and interesting series of foreign and Australian fossils from the National Museum collection by Mr. F. Chapman, who was ably assisted by Mr. A. A. C. Carter. The foreign fossils included some of the interesting Jurassic king-crabs, dragon-flies, lobsters, and fishes from the Solenhofen stone (lithographic), of Bavaria, and a series of coal measure plants from the English coal measures.

The Australian fossils comprised a well-preserved fossil jelly-fish, and a sea-weed from the Silurian mud-stone of Brunswick, Victoria; beautifully preserved fossils on an old Cambrian sea-beach from the Ord River, and some of the *Glossopteris* leaves from New South Wales.

The exhibit of the Pre-historic Club, under Mr. A. S. Kenyon's direction, attracted much notice, being at once diverse and comprehensive in character. Through the kindness of Mr. J. Kershaw, Curator of the National Museum, a most exhaustive and interesting series of ceremonial objects of the Australian aboriginal, and an equally valuable series of Old World implements, utensils, and ornaments of the Stone and Bronze Ages from the Lake dwellings of Switzerland were on view. Mr. W. H. Gill exhibited an extensive series of lime spatulae from New Guinea, a pair of Kurdaitcha shoes, and two death-pointing bones from Central Australia. Mr. Gilbert Rigg had a remarkable exhibit of stone *bouchers* or *coups-de-poing* from the Thames Valley, also palaeolithic imple-

ments with a relative set of Australian artefacts. Mr. E. S. Anthony exhibited a series of boomerangs, and other implements; Mr. F. Schafer, a collection of stone axes and other implements found recently in the metropolitan area; Dr. Wischart, stone axes; Mr. A. S. Kenyon, a series of pygmy and other small chipped Australian implements; comparative sets of Maori, Tasmanian, and Australian crude stone scrapers and cutters, a series of aboriginal stone axes from 1 inch to 10 inches in length, and grooved tomahawks in various stages of manufacture, with grooved American axes for comparison; aboriginal basket plaiting and netting work, shell and other ornaments, churingas and ceremonial objects.

The whole exhibit served not only as an effective display of the products of the Old Stone Age man of Australia, but was rendered also more instructive and interesting by the comparative sets showing the activities of men of similar culture in other parts of the world.

The entomological section, under the direction of Mr. F. E. Wilson, was quite a feature of the exhibition, twenty-six cases being contributed by twelve exhibitors. Mr. C. Deane also showed some excellent drawings of *Coleoptera*; Mr. J. E. Dixon two cases of *Buprestidae*, or Jewel Beetles, containing handsome and rare species, also one case each of *Cerambycidae* and *Amycterid* weevils; Mr. C. French three cases showing Australian Galls, scale insects, and mounted larvae of British *Lepidoptera*. Mr. Deane's draw contained numerous examples of interesting *Tenebrionid* beetles. Mr. A. S. Robertson showed a fine case of butterflies, comprising most of the Victorian representatives of the *Satyrinae*, some *Hesperiidae* or skippers, with some very fine examples of the rare *Heteronympha cordace*. Mr. C. Borch's case of attractive swallow-tailed butterflies and hawk moths from Queensland was an object of deservedly popular admiration. Mr. W. H. Davey tabled a case of gorgeously-hued and quaintly-formed foreign *Coleoptera*, also one showing the divisions of the order *Arachnidae*. A notable exhibit was that of Mr. J. Clark's two cases of ants, showing the famed honey ants of Central Australia, prized as a sweet morsel by the aborigines, also specimens of the dreaded Driver Ants of South America. There are Driver Ants in Australia, but, as Mr. Clark showed, they are insignificant as compared with their American brethren.

Mrs. Thorne kindly loaned two beautiful cases of moths

from the late L. B. Thorne's collection; one with specimens of the delicately-hued Emperor Moths, the other of the wood-boring moths, with some very handsome and also very rare species. Mr. A. Burns exhibited a delightful draw of Queensland butterflies in perfect condition, comprising handsome species of the genus *Euploea*, and interesting varieties of *Hypolimnias bolina*, also a case of the Economic Insects of the Sugar-cane. Mr. R. Blackwood showed beetles of the family, *Carabidae*, among them some fine species of the genus *Notonymus*. The National Museum, per Mr. J. Kershaw, exhibited two cases of the quaint *Phasmidae*, or Stick Insects, also two fine cases of *Hemiptera*, the *Cicadidae* of which were particularly notable.

Mr. F. E. Wilson, F.E.S., tabled three cases of beetles, comprising one each of Longicorns and *Scarabidae*, mainly *Cetonidae*, and one of quaint forms, including examples of Australian fire-flies.

In a side room, under the experienced direction of Mr. J. Searle, a fine and varied collection of interesting subjects of Natural History, including Pond Life, were exhibited under the microscopes, this section always securing a large share of eager public attention.

NATIVE TREES IN OUR PUBLIC PARKS.

The miserable appearance of the Gum trees in many of our Public Parks calls forth the pity of many passers-by. This, I think, may arise from two causes—the constant trampling over the surrounding land, both by men and animals, hence its inability to absorb the rain falling on it; and, secondly, the absence of native birds to act as scavengers of the insects, breeding or living on these trees. That there is something in my first contention is shown by the fact that a very large Red Gum, *Eucalyptus rostrata*, in the Victoria Park at Kew, one of the finest trees near Melbourne, was some two years ago showing signs of withering. The Curator, Mr. C. L. Plumridge, obtained permission to lay a special water service pipe to it, and by breaking up some of the surrounding soil, and judiciously using the water, the tree seems to have taken on a new lease of life. Let us hope other gums in our parks will be treated as intelligently.—F. G. A. BARNARD, Croydon, Vic.

NATIONAL MUSEUM LECTURES.

These lectures continue to be well supported and appreciated by the public. Members might note that for this month the subjects are—"Ants and Their Ways," by Mr. John Clark, F.L.S. Entomologist at the National Museum, on Saturday, 10th September, at 3 p.m.; and Tropic Isles," by Mr. Chas. Barrett, C.M.Z.S., on Tuesday, 20th September, at 8 p.m.

Both subjects should be full of interest and instruction.

"THE DOOMED TEA TREE."

BY EDWARD E. PESCOTT, F.L.S., PRESIDENT.

Under the above heading, Mr. Donald Macdonald, the well-known naturalist, has on several occasions in the "Argus," directed attention to the decadent condition of the Coastal Tea Tree, *Leptospermum laevigatum*, F.M., along the eastern shores of Port Phillip Bay, particularly within twenty miles of Melbourne.

Mr. Macdonald remarked that no one seemed to care that the Tea Tree was disappearing: he stated that the work of regeneration was urgent: and that such a body as the Field Naturalists' Club of Victoria should undertake an investigation into the cause of the decadence of the Tea Tree.

The challenge was too impelling to be passed by, and on behalf of the Club an investigation was immediately proceeded with.

The sea-front from Brighton to Mornington was marked off into several sections, each section being allotted to two or more members of the Club, with instructions to work on definite and similar lines. A series of eighteen questions and observations was prepared, and each observer was asked to prepare his report on these

lines. The question list is as follows:—

1. Prevalence or abundance of the Tea Tree.
2. Vigor of growth or otherwise.
3. Presence of insect attack.
4. Presence of fungal or bacterial attack. (Specimens of 3 and 4 to be collected.)
5. Effect or consequences of these attacks: note whether young growth, old growth, or trunks are affected.
6. Presence of any natural decay.
7. Soil conditions. Has the soil been interfered with by digging, clearing, burying rubbish, raking up leaves; general tidying of areas?
8. Any evidence of decadence from "old age."
9. Any evidence of damage due wilfully, either by public, or by concerted action. Any unnecessary cutting down of areas.
10. Any place where Tea Tree is not growing at all. Why?
11. Any efforts at regeneration—natural or artificial—i.e., replanting.
12. Presence of native plants in association.
13. Presence of alien plants in association.

14. What opportunities of renewing growth in old or destroyed areas.
15. Any evidence of suffering by drought.
16. Presence of bird life.
17. Is the Tea Tree deteriorating where water is abundant.
18. Any other or general remarks.

The enquiry and investigation aroused considerable and widespread interest, so that many offers of help were received. To those who helped in the investigation, and also who generously drove the workers in their motor cars, the Club tenders its best thanks.

Many letters have been received, referring not only to the sections under investigation, but also to distant areas, such as St. Leonards, Portsea, and Point Lonsdale. These will be dealt with in the report. An interesting letter was received from one of our foundation members, Mr. C. French, Senr., who has known the foreshore, and the Tea Tree for over seventy years. Mr. French refutes statements that the Tea Tree is as abundant now as it ever was. He agrees that the Tea Tree is definitely disappearing.

Several investigators entered upon the work with a knowledge of the foreshores of over thirty years, so that the observations were made with mature thought and knowledge.

The results of the investigation have definitely proved Mr. Macdonald's challenge, that the Tea Tree is decadent—not only so, it is dying out, and being killed out very rapidly.

The decadence of the Tea Tree is more noticeable in the suburbs near to Melbourne: and as we go further towards Mornington the quality and quantity increase quite noticeably.

At Brighton, the foreshore is completely denuded of the trees; between Hampton and Sandringham the trees are only in fair abundance; at Sandringham there is very little; at Black Rock the reduction of the trees in recent years is deplorable; between Edithvale and Carrum the Tea Tree is only plentiful away from the coast. While from Seaford to Frankston and Mornington, the reports show that the trees are still present in abundance; and from Mornington for several miles it is practically continuous. How long under the present management, will this abundance prevail?

Again, it is reported that at St. Leonards, the shelter is fast disappearing.

One noticeable, and, indeed, very serious feature is the absence of young plants for miles. Thus natural regeneration has practically ceased. The trees at present clothing the shores and cliffs are all old specimens. We have no knowledge, nor records, of their age; but if regeneration be not carried out, then the older trees reaching the limit of their age will die, and that will be the end of our Tea Tree.

At present, normal regeneration is prevented for several reasons.

First: There is the traffic among the Tea Tree. This is continuous; and so young seedlings never get a chance to grow.

Second: Picnickers leave so much litter and rubbish behind them. This is cleared up and buried. Thus young growth is killed.

Third: Alien weeds, such as Cape Weed, various imported quick growing grasses, and others are crowding out the native herbs. Orchids were common ten years ago, now they are quite rare. The small leaved Clematis was abundant; this has gone from many localities. The quicker and stronger growth of foreign weeds have smothered out all young plants.

Fourth: Young seedlings generally grow at the outside of the older plantations. Along the coast traffic is common on both sides. Foot traffic destroys the young plants on the coastal side; while the roads occupy the inner side. Then there is the factor of road dust, which smothers out the young plants. Regeneration is common in places away from the foreshore, where traffic and dust are absent.

It must be here emphasised that destruction by visitors and picnickers is exceedingly rife. Trees are ruthlessly chopped and broken down, in many ways. There seems to be very little respect for the groves. In one young artificial plantation, some picnickers had deliberately broken and torn down some young plants in order that they might have a secluded place to play cards, and drink beer, leaving their debris and bottles behind them.

In several localities young plantations have been established, clumps of young trees having been brought from inland. In some cases these have been shockingly neglected. In others, the young trees have grown well, making as much as four or five feet of growth last year.

More organised plantings are needed. Some investigators report that abundant regeneration follows a fire. This is one method. The other method is transplanting.

The investigation shows that drought is quite a negligible factor in the decadence of the Tea Tree. It should be remembered that the Tea Tree has survived far worse droughts than the recent ones. Further, wherever the young plants are growing, they have made several feet of growth in the current season.

Disease is very abundant. Mr. French will report on scales, gall insects, thrips, leaf miner, and other pests. Birds are almost absent everywhere, as a result of population and traffic. Thus the balance of nature is quite upset, and the pests abound. These affect the older trees considerably.

Still, young plants are also attacked, and yet they make good advance in growth.

It is noteworthy that wherever the plants are cared for, that is, in private gardens or plantations, they thrive exceptionally well.

Native plants on association, such as Honeysuckles, Shoaks, Coastal Wattles, Boobyalla, are all suffering from destruction in the same way. They are ruthlessly cut down for firewood or other purposes; there are no young plants; and the young growths are being torn down for house decoration. One physiographical feature which was not the subject of our observation, but which has an important bearing on the foreshore question, is the subject of foreshore erosion. This was the subject of a valuable report made by Mr. C. W. Wilson to the 1926 annual meeting of the Beaumaris Tramway and Improvement League. Because of its great importance, extracts are here given from this report.

"On the flat lands at Rickett's Point, I took measurements four years ago, and to test what was happening I found that the foreshore was 31 yards from the public road: to-day it shows a loss of 12 feet." The sea here has eaten well into the foreshore, and it is only a matter of time when these lovely old honeysuckle trees will be no more.

"Opposite Reserve Road, 22 feet of foreshore has been washed away, as much as 10 feet disappearing in a winter gale. Rickett's Point eight years ago was 195 feet further out.

"From Rickett's Point eastward, the loss of foreshore is from 10 to 15 feet.

"Table Rock—serious erosion—8 yards within the last eight years."

This is, indeed, a serious condition, and while the disappearing Tea Tree is a pressing factor, the disappearing foreshore is indeed an urgent one as well.

CONCLUSION.

What, then, is the remedy? Are we to keep our Tea Tree? The slogan of this Club will be—**WE WANT THE TEA TREE.**

The Tea Tree *must* be preserved. The remedy is simple.

First: Where the trees are thin, or where there are none at all, areas right along the coast should be replanted with young plants, which are readily available. These plantations should be securely fenced with barbed wire, and damage to these should be followed with severe punishment. Where the present plantations or old trees are thin and weak, these should be cleared out and planted as above suggested.

Second: Traffic should be limited by fencing off some areas. Picnicking, camping, and motor parking should be limited to specially defined areas.

Third: The control should be vested in one central body, which could manage the whole of the foreshore of the seaside resorts. There are at present too many bodies controlling the various areas. These bodies are doing little or nothing for the preservation of the Tea Tree. One corporate body, with no local interests, no votes to seek, would form the best system of management.

Associated with these, is the question of shore erosion, which, as before stated, is a very urgent matter.

The investigators do not favour planting foreign trees. This method, besides being costly, would take away the distinctively Australian or coastal character of the foreshores. The Tea Tree *can* be regenerated; and it will be the aim of this Club to work to that end. Our foreshores and beaches are the delight and pleasure of thousands of visitors each year; and if the facts as above stated were brought home to them, it is certain that the damage would be far less than it has been.

We must ever regard the Tea Tree as an heritage to be cared for earnestly to be protected jealously, and to be handed down to future dwellers and generations as unimpaired and as beautiful as we found it.

THE HISTORY OF FLORA AUSTRALIENSIS.

BY CHAS. DALEY, B.A., F.L.S.

(III.)

(Continued.)

It was on April 18th, 1862, that Bentham acknowledged the safe receipt of the first box of specimens in excellent order, and his intention to set regularly to work. "Next month, I hope I shall have made progress with the early orders, and be able to say more of the valuable collection you entrust to my care, and which, for my own satisfaction, I shall be anxious to return at the earliest possible period. I desire to begin printing early in autumn, but for that I must have the greater part of the volume in MS.; for, by the arrangement made with the printer, he gives three sheets per week. . . . I should like this time to have the first volume of *Flora Australiensis* out not long after Xmas next.

On May 10th, 1862, he writes that the second box of specimens has arrived, and that he has done up to Cruciferae. "Your collection of Victorian plants is most valuable, and I hope you will receive all safe back, and your other Australian specimens, a most material help, in addition to what is to be seen here. I carefully avoid mixing them with others, so that you may find yours intact. I agree with you on most of your union of species, although perhaps there are a few marked forms I may be induced to keep up, not to go too much against the opinion of others."

Later, May 24th, he writes:—I am puzzled with many of the localities in your labels. I find the greater number of them in the excellent atlas we have, but there are several such as Sealers' Cove, Mt. La Perouse, etc., which are not there. I am also embarrassed sometimes to know who the collectors are. . . . D.M. at first puzzled me much, as you generally adopt the initials F.M.; but, on comparing localities, I conclude it must be yourself."

On July 14th he announces the despatch of the first box received, and the safe arrival of one with Rutaceae and Violaceae.

"By the time I can get your answer to this, I hope the volume will be far advanced, and would like to know—

(1) What adjunct you wish to put to your name in the title? I suppose F.R.S., Government Botanist to the Colony of Victoria—but anything else you wish.

(2) What I can say in a few words about those col-

lectors who have been supplying you with Australian plants; . . . and also give me some general sketch of your peregrinations in various parts of Australia; for, although I cannot give the preliminary discourse till I come to the last volume (if I live long enough), I must, with the first, give a short sketch of what has been done in the Botany of Australia from its first discovery, and the sources whence the materials of the flora are derived."

On July 24th, from Kew, is an interesting letter in reply to one from Mueller referring to the limit of species, and the points of identification:—

"With regard to your views about species, you seem to have taken a wrong view of mine. I had a great many years during my continued observation of living plants in a great variety of stations in almost every country in Europe, devoted much attention to the subject, and had come more and more to the conclusion that species had fixed limits, difficult as it is often to find them, and that genera and orders were arbitrary, and though I never wrote much on the subject, I collected a great number of facts and explained my views somewhat generally about genera in a memorandum in one of the first volumes of the Journal of the Linnean Society, and I believe in a review of De Candolle's *Geographie Botanique* in the "Edinburgh Review." But I entered much more in detail into the question of species in a paper read at the Linnean Society in November, 1858, but of which circumstances prevented the publication at the time. Two and a half years later it was inserted in the first volume of the "Natural History Review." . . . It was immediately after reading this paper that Darwin's remarkable observations were first made known, and whatever may be the opinions upon the speculative portions of the work, it is very certain that the numerous facts he has observed must cause naturalists to reconsider their previous opinions, and I begin to think that my former views of the fixity of species must be in some measure modified, or at least exceptions admitted. But, however that may be, if species are fixed, the evidence of what is a species, and what is a race is never positive—always more or less circumstantial (whatever is not positive is not specific), and therefore "differently appreciated by different minds; and there is no hope of establishing the limits of species so as to admit of no dispute even on the part of the most experienced, the most acute, and the most right-judging botanists, without even taking into account that all men tend to attach undue importance to evidences discovered by themselves over that which others have."

In regard to the financial assistance towards the production of the Flora, Victoria, New South Wales, Queensland and South Australia had responded favourably.

From Church Stretton, on August 25th, 1862, Bentham refers to the position:—

"Many thanks for the transmission of the £100 for the first volume to the Victorian agent for me. I have written to

enquire his name and address, and shall immediately communicate with him on the subject. The Governments of Queensland, New South Wales and South Australia have each promised £50 per volume, which makes up the £250 required. Western Australia declined, but will, I hope, take some copies of the work, as also will, I trust, Tasmania. I consider that Victoria will be entitled, without further payment, to at least 20 copies, and those Governments which contributed £50 to 10 copies each—making altogether 50 copies, and I should be very glad if I could get 50 more subscribed for by the Governments, as my arrangements with the publisher will require that 100 copies should be taken at the full price. This I can do out of the £250, but I hope, after the liberal example set by Victoria, I shall have a few more copies taken by the Governments. With regard to the progress of the work, after my return to town the first days of October, I shall be able to proceed steadily without interruption, and I calculate that soon after Xmas, I shall be able to begin printing; for your own Flora of Victoria, backed by your own specimens, render the labour comparatively light. It would therefore be very important for me, if you could let me see, as early as possible, all the new specimens of *Thalamiflorae*, etc. You have described in the last number of your *Fragmenta*, your new *Anonaceae*, for instance. I am in doubt whether they are or are not distinct from some of those I have from Cunningham, MacGillivray, etc., perhaps in a different State, by which all doubts may at once be cleared up by a glance at the specimens.

"Mr. Heward has most liberally, on hearing the work I was preparing, presented to Kew, Cunningham's own set of his plants. I have from Soudan an almost complete set of Preise, and I hope before the volume goes to press, to make a short trip to Paris to see a few of Leschenault's and Baudin's plants described by de Candolle, so that there will be very few Australian species, of which I have not seen authentic specimens. Brown's are particularly valuable, as showing vegetation at a time when there were very few introduced plants, even at Port Jackson. . . . I do hope you will go on as steadily as possible with your important plants of Victoria, which saves me an immense deal of labour."

He also notifies that he is sending Mueller the first volume of his *Genera Plantarum*, just published, and will also send his photograph.

In the month of October, he writes, "I am very glad to hear that you are pursuing the publication of your Plants of Victoria, as I am anxious that you should always precede me in order that full justice should be done to your labours, and yet I have at my age no time to put off if I have any hope of bringing my work to a conclusion."

You caution me continually against publishing as synonyms catalogue names unaccompanied by diagnosis, and I shall avoid it, except where they have got within reach of Germans, who, receiving specimens with the

names in vendor's herbariums, or referred to in the Linnean, are sure to take them up as "*species neglectae*," if not disposed of in some way.

In a letter from London on October 26th, 1862, he deprecates Mueller's uneasiness about boxes sent from Australia. "Boxes do not get lost in London, but it often takes some time before they are cleared."

"With regard to the unity of species, I quite agree with you on the necessity of reducing the large number of bad species published of Australian plants; but, as to fixing definitely the limits of anyone, I think it hopeless. I have studied species living, wild, and in cultivation,—and dry since 1819. For the first two or three years I was always detecting new species *à la* Friday; then observing the small species in a living state at differences of latitude of about 15 degrees first opened my eyes as to the variability of species. The next thirty years gradually convinced me of the possibility of fixing positive limits if taken comprehensively enough, but the last eight or ten years have very much shaken the conviction, and the great number of facts brought to light by the Darwinian controversy necessitates the reconsideration of a great many points which I had thought settled. We must, therefore, be particularly cautious in uniting as species forms which have that degree of apparent permanency which will justify the majority of botanists in maintaining them distinct."

On December 22nd, 1862, he mentions being employed on *Rutaceae*—"Have done *Zieria*, *Boronia*, *Eriostemon*, *Correa*, and *Phebalium*, all of which appear to me to be natural as well as definitely characterised, and too generally kept up by botanists of eminence to be lightly interfered with."

At the beginning of 1863 Bentham visited Paris in order to verify a few species of plants not otherwise available. He had forwarded to Mueller a proof of the title-page for his approval before setting-up the first volume of the *Flora*, and advises that he will send clear proofs of the text by each mail. He had finished *Rutaceae* and *Malvaceae*.

In a letter on February 12th, 1863, he states a reasonable objection to accounts of new Australian plants being sent to outside societies for publication, instead of being made easily available for the *Flora*:—

"You mention having sent your account of Gregory's plants to the Edinburgh Society for publication. I am sorry for this. The consequence will be they will appear perhaps a twelve months hence, and, at any rate, long after the publication of my first volume, which I think scarcely fair.

"It appears to me that while I am publishing the *Flora*, professedly with your assistance, all new plants you have to publish should either be inserted in your *Fragmenta*, or other works you publish yourself, and of which you send to Sir

William Hooker early copies that I can make use of—or the specimens sent to me to publish if you prefer it, as I always make a point of retaining your names when not pre-occupied. It is only by following one of these courses that you prevent useless additions to an already overloaded synonymy."

On March 19th, "On account of the separate grants from the different colonies, I have thought it best to distinguish prominently the stations belonging to each colony, in order that each may see at once what belongs to their own flora. I have taken the boundaries of Queensland as given in our most recent map to include Cape York, and from there south in a straight line, and I have called Northern Australia all tropical Australia west of that line, including the north-west coast."

From Wilton Place, on April 25th, he advises that he is sending additional proof sheets of the Flora, and all remaining plants described in the first volume, and acknowledges receipt of supplementary *Thalamiflorae* and *Leguminosae* from Victoria.

Concerning the differences of botanists in regard to the limits of genera and species, Bentham states:—

"When I differ in opinion from you I state both opinions, adopting yours when I have doubts as to my own; adhering to mine when I am more convinced I am right; but always it will be for future botanists to decide for one or the other. I have had too much experience to feel perfect confidence even when I have had the fullest conviction at the time. . . .

"You again urge me not to publish as synonyms names unaccompanied by diagnoses. I have already said that I do not take up mere manuscript names,—but where names have been printed and published, if they are not mentioned in a work like this, it will always be supposed that I had not seen them, and German botanists at least will enumerate them as species not "*satis notae*." I see no way of avoiding this, but by great caution in not giving names to specimens unless they have been sufficiently investigated to be tolerably safe from error. Names once launched by a botanist of your known experience and knowledge of Australian plants are adopted, and enter into systems and computations, and must, in some manner, be disposed of."

The whole of Volume I. is in the printer's hands. Bentham again states his strong objection to Mueller naming plants after him. His sensible comment on this point of scientific etiquette is, "I must beg you not to name species after me. I have so often expressed my opinion that, unless in very exceptional cases, species ought to be named after no other person than those who collected or discovered them, and it would be awkward to have plants named after me in a work I am inditing."

It was about this time that Dr. Mueller seriously thought of making a visit to England, an intention which,

through some reason, probably pressure of work, was not carried out. On June 24th, 1863, Bentham alludes to this:—

"I am disappointed at having to defer the pleasure of making your personal acquaintance, but on the other hand I must admit that you will be usefully employed in continuing your great work on the Victorian Flora." Mueller had purchased for £10 some copies of the *Genera Plantarum* to be sent to some of his friends, and had suggested that a specially bound copy should be sent to the Prince Consort, who had since died.

Bentham writes, "It was all very well while the Prince lived, as he took an interest in science; now there is no one about the Court who cares at all for such subjects. The book would be quite wasted—not unlikely become somebody's perquisite, and I certainly should not care to join in any such useless present."

He mentions the receipt of £50 each from New South Wales and South Australia, that from Queensland to follow, the arrangement being that for every £50 subscribed, 15 copies of the Flora were to be sent to each contributing Government. Thus each of the three mentioned got 15 copies, and Victoria 30 copies.

He gives much detail in regard to the Order *Leguminosae*, the despatch and the receipt of plants, and writes the characteristic personal note, "Pray do not address me as Mr. President Bentham, for that is not the custom in this country, however it may be in Germany."

From London, October 12th, 1863, he acknowledges the receipt of *Acacias*, *Jacksonia*, *Gastrolobiums*, etc. In regard to some of the returned plants suffering from damp when received in Australia, he states that they were quite dry when sent, and were "always kept in the room where I work, in which there is a fire all day, five days in the week during autumn, winter, and spring.

I shall go over your remarks and corrections with my flora, of which I have an interleaved copy for the purpose. To what you say of illogical adoption of genera such as *Phebalium*, upon a character which is not considered generic, I shall give consideration."

Bentham finds the *Leguminosae* difficult, concerning which he writes, "It is very seldom that the pod alone will fix the genus of a leguminous plant."

He hopes to publish the second volume of the Flora by March, 1864. The first volume had been well received,

and it is of interest in view of the relations between Bentham and Mueller, to read a letter sent by the latter to Professor Oliver:—

Melbourne Botanic Gardens,
Christmas, 1863.

My Dear Professor Oliver,—

I feel that I owe to you, as the botanical editor of "Natural History Review," my cordial acknowledgment for the graceful and generous manner in which you alluded to my co-operation with Mr. Bentham in his publishing the Australian flora. Not only are your kind sentiments gratifying to my feelings, but they may tend also to mitigate the disadvantage which has unavoidably arisen to myself by the publication of the work in London.

Speaking in frankness to you on this occasion, I see no reason to withhold from you the fact that my relation to Bentham's work has generally left here the impression on the public mind that I was unqualified to deal with such a task myself, and notwithstanding some favorable remarks by Mr. Bentham himself in the preface, others rather uncautiously written are rather strengthening the opinion.

You can, my dear sir, readily understand that as an officer of the Australian Government, under whose general range of duty, issue of a work on the plants of this great land naturally ought to come, it cannot be otherwise than painful to me, when I see, in reference to the publication, sneers passed on me, or unsatisfactory allusions made to it in the public press.

Though, when Mr. Bentham resolved to write the universal Australian Flora, I could at once see the disadvantages and losses which would arise out of any arrangement I could enter into, I sacrificed my private feelings for what I considered a service rendered to science, and in this regard you have done me the fullest justice.

Yet, though I shall always know (how) to distinguish between my private feelings and my public duties, it will ever remain a source of the deepest regret, that the brilliant talents of Mr. Bentham were not rather occupied in the elucidation of the botanical treasures of tropical Africa or some other region botanically unknown, and for the investigation of which the Kew collection would have afforded more ample material than that such a talent should be wasted in the edition of an Australian Flora; I venture to say, almost wasted, because in the course of time I could not have failed to carry out the most of the same detailed work now emanating from Bentham. Whilst I feel convinced that as Australian field work experience is required to recognise the limits of species, I fear also that very many of Mr. Bentham's newly established species will not stand the field test.

It is also right to be assumed that in our yet limited and struggling communities here, scarcely anyone's leisure allows him to enter closely into the study of natural history as a means of employing spare hours, and that therefore the issue of a work like the Australian Flora might have been very well deferred for some years.

You will see this verified in the return of the sale (?) in Australia of such a magnificent work as Professor Harvey's

Phytologia, though that also refers to Australia exclusively, and is a real ornament of botanical literature.

Moreover, the delay of the publication of an Australian flora for a few years would have been highly advantageous, as now already the material for the first volume has become largely supplemented, and until more is sent by my friends in N.W. Australia and by a special collector I have in the field in N. Eastern Australia, one will have a very imperfect knowledge of what actually the flora of Australia produces. My plan, so long cherished, was this—to work up critically the plants of Victoria, and along with them, and as otherwise occasion might arise, also moreover the extra-Victorian plants. This would have given me the material for final re-arrangement in one universal work on the plants of Australia, and for its completion, I could at least have devoted two summers and one winter in Europe for the revision of collections there.

Meanwhile, my material for critical comparison would have vastly increased. I have now, for instance, a set of Geetze's botanical relics, one of the largest sets of Preissian plants, also many of Sieber's, and within the next week I shall possess, from another source, one of the largest of Drummond's collections. Cunningham's and Brown's plants, although years ago more or less obscure to me, because they were so briefly described, I can now generally interpret with comparative ease, since I have now most of the plants (in regions where they were collected) represented in my herbarium. My library has, moreover, after a heavy personal outlay, extended so far that it means but little exertion to render it complete in the literature of Australian plants.

Of the present extent of our collections you are able to form an independent judgment. To me it appears that what I have collected, and caused to be collected, is more extensive than the contents of British collections of Australian plants, if what was furnished towards them by myself is excluded. The effect of the existing arrangement has been greatly to disturb my plan of life, to bend much my spirit to proceed on my path, and to render me much less buoyant to work as I otherwise might have done.

Having spent the best years of youthful vigour, enormous exertions, and almost a fortune on a plan which now, to a certain extent, had been frustrated, I hope you will make some allowance for the feelings I expressed to you, though what I said was not intended to wound the sentiments of anyone.

Your respectful,

FERD. MUELLER.

This frank letter to Oliver throws a sidelight upon the existing arrangement, revealing how keenly Mueller felt, having to give up the preparation of the Australian flora, and how great a sacrifice he made in doing so. His explanation as to the plans he had formed for working out this flora in Australia suggests the reasonable doubt whether their surrender was really necessary or warranted.

Meanwhile, the work was in progress. In March, 1864, Bentham received from Australia the Myrtaceous

plants, with a further consignment in May, and also Victoria's subsidy of £100 towards the second volume. He writes, "I am almost overwhelmed with the Acacias . . . examining and describing."

Concerning the famous botanist, Robert Brown, he affirms, "No one botanist, however eminent, has been found to be so uniformly accurate in every one of his works, great and small, except only that appendix by Kietz, the only thing he ever wrote in a hurry, and with perhaps a little animus, which it is useless to allude farther to. He forgot his usual caution before publishing." On August 23rd he is hoping to send the second volume by next mail. Actually the copies were sent in October. The third volume will comprise *Myrtaceae* *Compositae*, and intermediate small families.

Concerning the support accorded to the work by the Australian Governments, he writes, "It would have been more satisfactory if some of the other governments had been as liberal as yours, for there is more labour than I had reckoned upon in working up above 1,100 species (for the last volume 1,500).

"I fixed my own terms, and will go through the work if I am spared in health and strength sufficient for the purpose."

In regard to the receipt of a photo. of Mueller he writes, "It is a credit to Victorian art."

He is at work on the *Leguminosae*, and has nearly finished *Podalyriue*, in which he has reduced the number of his own species.

For the second volume beginning in January or February he solicits the materials at the earliest convenience. He mentions having 200 covers of Allan Cunningham's specimens, and that Brown's collection is the most remarkable of the whole. He would have sent a copy of his anniversary address, "but I thought you were on your way to Europe."

On November 19, 1863, he asks, "Could not you send any paper for the Linnean Society? Any of your observations on the comparative vegetation of the different descriptions of country in Australia, the forest land, the scrub, the sandy desert, etc., would be very valuable."

Towards the end of the year, 1864, there occurs some friction on account of letters written by Mueller to Dr. Hooker and to Bentham, evidently under the sense of personal grievance or pique entertained by the writer. These disturb the previous harmony in some degree, and

provoke from Dr. Hooker a sharp rebuke contained in the letter appended hereunder. Bentham, whose temperament was unruffled and opposed to dissension, took the matter more calmly.

A case of *Acacia* is just arrived and unpacked yesterday - with a parcel for *Peucea* which has been forwarded and for I forget who - I had just time to see that the parcels were in good condition - A few specimens of the previous boxes had again got a little muddled when unpacked but to no great extent.

As soon as your *Podalyrium* and *Genista* or all come I shall begin repacking and returning a case or two at a time.

Yours ever sincerely
George Bentham

Could not you send us any paper for the *Linnaean Society*? Any of your observations on the comparative vegetation of the different descriptions of country in Australia the forest land the scrub the sandy desert etc - would be very valuable.

The causes of Mueller's hasty letter seem to have been a combination of annoying circumstances, the sum total of which produced the exasperation of mind which Mueller reflected in his letters. Thus there was a mistake regarding payment of freight on cases, a disagreement in views on the delimitation of species and on specific names, also a difference of opinion regarding the wisdom of issuing supplements and addenda to the work in progress, and finally a sense of umbrage at Sir William Hooker sending a consignment of Cork Oaks to Australia without communicating with Mueller in his official capacity.

Dr. Hooker, after thanking the author for a volume on the botany of the Chatham Islands, writes from Kew, on December 2nd, 1864:—

"I am much concerned to find from the tone of your letter to me, from the absence of any to my father, and from your angry letter to Mr Bentham, that you are much incensed with all parties here.

To begin, then, with myself. I had nothing to do with sending Cork Oaks to Australia, though had the duty fallen to me, I should assuredly have acted as Sir Wm. Hooker did in that matter, acting, as he did, under orders; and, after all, seeing that you have, on the one hand, hundreds of Cork Oaks in the gardens; and on the other that you are yourself the active head of the Acclimatisation Society, I cannot understand in what manner you are officially or personally offended, or have reason to blame my father through me, a course which is painful to me, and wanting in official courtesy to him who abounds in friendly feelings to you, and has never felt or shown any other.

In the matter of the cases being sent, unpaid, to you, I am wholly or chiefly to blame. The accident is due to the change of curators, a change of which I have informed you, and which, considering its magnitude and importance, and the revolution it causes in internal organisation, must be held to make allowance for accident. I had myself wholly forgotten which way was paid (out or home). When our new curator asked me, I said, "Find out how it was before, and do as before." As it is, you cannot suppose that it was ever intended by us to do you wrong or injustice as the tone of your letter implies. At any rate, we might have expected the courtesy of being asked how it happened.

Again, you allude with acrimony to our wealth, and pecuniary matters compared with your establishment, wherein, I think, you err. You have no idea how sharply every shilling, every half-penny we spend is criticised, and especially on *amounts* and charges for carriage, etc. Knowing, as the Audit Office does, that in respect of most foreign countries we have to pay *both ways* of necessity, it insists on our not doing it, and, if possible, to avoid it.

The comparative wealth of a public office does not depend upon its expenditure, but on the account required to be kept of that expenditure, and my account for ours is scrutinized by

the Board of Works and the Audit Officer, and the Treasury, and we have letters of enquiry.

We are allowed no margin at all. I doubt if this is the case with you. Our correspondence in the matter of exchange with you has always been behind what I should have liked and wished; but, in the first place, our late Curator, Mr. Smith, was a very old man, nearly blind and quite unequal to the heavy duties of his part; and, secondly, my father is quite disheartened at the cost of the transport of cases of live plants, and the diamally bad condition they arrive in both out and home.

Pray do not be annoyed at what I say, and pray remember that we are absolutely overwhelmed with work in the Gardens, Museum, and Herbarium, and that being the Referee on all manner of subjects for the Treasury, Admiralty, Board of Works, Indian Office, Board of Trade, and innumerable private bodies, Gardens, and institutions all over the world, we are hard put to get along with our correspondence especially. Then, too, we are exposed to incessant collisions with our brother botanists, which is a very wholesome, though not always agreeable discipline to which you are not exposed.

Lastly, let me beseech you to remember that Mr. Bentham is a peculiarly sensitive person, who shrinks exceedingly from unpleasant correspondence; he has never yet had any unpleasantness with any Botanists, British or foreign, and is a gentleman of unbounded liberality of sentiment, delicacy of feeling, and great judgment. Born, as he was, a gentleman, of private means, and giving his whole time and means to science for no pecuniary reward, and regardless of praise or worldly flattery, his position is the most highly-respected of any Botanist in Europe, because the most independent and most unselfish. Such a person must feel the tone of your letter, most deeply grieving.

Believe me, my dear Dr. Mueller,

Most sincerely your

J. D. HOOKER.

(To be continued.)

SAGACITY ON THE PART OF A GUM-TREE.

The previous owner of the property where I am now living, in order to get rid of the native vegetation—rushes, sedges, leptospermum, etc.—growing on the ground, skimmed off two or three inches of soil with the plants, and piled it in heaps in various places. One heap he made close to a Eucalyptus sapling, probably a Swamp Gum, *E. ovata*, having a stem of five or six inches in diameter. This heap contained about a couple of cubic yards of well-rotted material. In the autumn I decided to utilise it as top-dressing for a grass-plot. When removing the soil, I found that the tree had sent out long roots into the heap of soil, one of them being fully ten inches above the original surface of the land. The principal root was over three feet long, and had a diameter of quite half an inch. No doubt the tree learned by some means that the heap of soil was of good nutritive value, hence its desire to make the most of it. How long the heap had been in position, I cannot say, but probably at least two years. This seems to me a remarkable case of sagacity. One would not expect a vigorously growing tree to send out roots above the level of the ground in which it grew. Query—Would heaping soil about a tree be an additional means of inducing it to grow?—F. G. A. BARNARD, Croydon, Vic

A CONTRIBUTION TO THE GENUS GREVILLEA.

BY H. B. WILLIAMSON, F.L.S.

GREVILLEA POLYBRACTEA, sp. nov.

Frutex 50-150 cm. altus, ramulis pubescentibus, foliis subsessilibus lanceolatis obtusis brevissime mucronatis margine recurvatis supra glabris vel minute scabris infra appresso-pilosis, racemis sessilibus dense multifloris (18-34 fl.), rachi tomentosâ 7-10 mm. longâ, bracteis ovatis ciliatis deciduis 5-7 mm. longis quaque binos flores subtendente, perianthio circiter 1 cm. longo extus dense coccineo-villoso intus praeter quatuor albos cirros glabro, toro fere recto, glandulâ hypogynâ prominente 1.5 mm. longâ apice dentatâ, ovario longe villosa, stylo villosa 1 cm. longo, stigmatate laterali.

Victoria: Mt. Granya, C. Walter, Oct., 1891. Corryong, E. W. Curtis, Oct., 1917. Granya Gap, Tallangatta, H.B.W., Oct., 1925. N.S.W.: Dubbo, Sources of Macquarie River, Curran, 1882.

The leaves of this shrub are lanceolate, from 2 to 3 inches long, and are scarcely to be distinguished from those of *G. floribunda*, R.Br. Instead of the loose raceme of that plant, which sometimes attains a length of 1½ inches, with from 8 to 12 flowers, it has a rachis reduced to about ¼ inch, on which are crowded often as many as 25, and sometimes even more than 30 flowers on pedicels about ¼ inch long. It is remarkable also in having its flower buds enclosed in scale-like hairy bracts, one to every pair of flowers. As the buds develop, these bracts grow so that they conceal a cone-like mass of young flowers, and when all the outer bracts have fallen, some of the inner ones may often be found retained among the closely packed flowers. It has been noted that in all specimens of *G. floribunda* examined by the author, the perianth segments are connate for about 2 mm. at the base, so that even when the fruit has well developed, the perianth is not forced off, but remains surrounding the fruit, while in this plant, of which no well developed fruit has been seen, the segments are at an early stage free to the base. They are also more nearly equal in breadth, straighter and narrower, while the investiture, including the white internal tufts, is much looser and longer. The ovary, style and stigma are much alike in both plants, but in *G. floribunda* the hypogynal gland is broad, short and truncate, while in this species it is narrow, twice as long, and somewhat dentate at the apex. The large, crimson

bunches of flowers make it a showy shrub, well worthy of cultivation.

GREVILLEA CHRYSOPHAEA (F.v.M.), *nomen nudum* in First. Gen. Rep. 17 *G. floribunda*, R.Br., ex parte.

Frutex 1-2 m. altus, ramulis pubescentibus, foliis subsessilibus ovatis vel oblongis obtusis minute mucronatis 1.5-3 cm. longis circiter 1 cm. latis supra glabris infra tomentosis, floribus 3-7 in racemo brevi recurvato 1 cm. longo, pedicellis 4 mm. longis, lobis superioribus perianthii 1-1.5 cm. longis inferioribus 7 mm. longis usque ad basin liberis extus dense rufo-vel luteo-tomentosis intus fere glabris praeter parvum cirrum infra medium, toro fere recto, stylo 1.5-1.7 cm. longo tandem fere recto, glandulâ latâ non prominente, ovario villosio stigmatate laterali vix umbonato.

Victoria: "Avon, McAllister and Latrobe Rivers, Steiglitz, Station Peak, F. Mueller. Geelong, Dallachy." Fl. Aust. V. 440.

This plant differs from *G. floribunda*, R.Br., in having shorter and broader leaves, with veins of the upper side less prominent, in the colour of the flowers which is more often yellow than red, in the few-flowered racemes, and in the general character of the perianth segments. In *G. floribunda* the racemes are often nearly 1½ inches in length, with as many as 15 flowers, and the style is only about ¾ inch in length, scarcely exceeding the perianth, and does not straighten out as the long style of our plant does. The diversity in size of the two pairs of the perianth-segments is much greater than in *G. floribunda*, and the segments are quite free, and are soon pushed off by the expanding fruit, while in *floribunda* they are connate at the base, as the advanced state of the flowers with well developed fruit shows. The position of the interior hair-tufts is different, being further from the base in *floribunda*. The stigma also is more prominent (umbonate), in *floribunda* than in this plant. The plant shows more affinity with *G. alpina*, Lindl., in general character of habit, leafage and inflorescence, resembling a large-leaved form of that plant, but *alpina* has leaves scabrous hairy on the upper side, a perianth not densely hairy outside, more umbonate stigma, and a very prominent hypogynal gland.

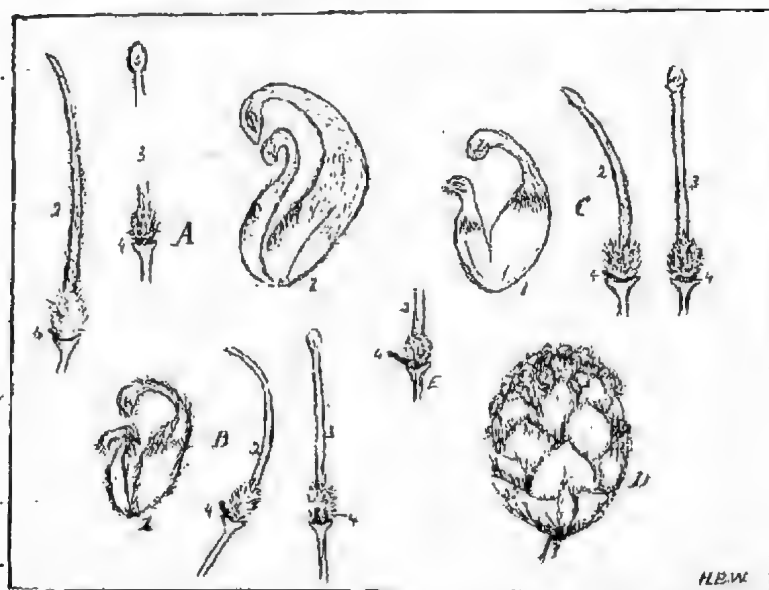
No N.S.W. specimens have been examined, and it is probable that it does not occur there. So far it has not been recorded outside the limits of Gippsland, except in the Brisbane Ranges.

Var. *canescens*, var. *nova*.

Ramulis foliis juvenibus racemisque canescentibus.

This is a form which has its young growth quite white with a fine woolly tomentum.

Sperm Whale Head. F. Barton, jr. Oct., 1926.



A. *Grevillea chrysophaea*. B. *G. polybractea*. C. *G. floribunda*. D. Unopened inflorescence of *G. polybractea*. E. Ovary of *G. alpina*, showing gland (4). 1. (in each) inside view of a pair of lateral perianth segments. 2. Style, side view. 3. Style, front view. 4. Hypogynal gland. All $\times 2$.

NOTES ON THE FAMILY.

The Genus *Grevillea* belongs to the Family (Nat. Order, obs.) PROTEACEAE, which was founded on the Genus *Protea*, *Protea mellifera*, of Linnaeus (South African Honey flower), being the type. It was so-called from the Greek god Proteus, who is credited with being known in so many different shapes. The name is not inapt, for few families in the vegetable kingdom show a greater diversity of form of flowers and foliage. Outside Australia and New Zealand (two species), the family is represented in the Indian Archipelago, Tropical Asia, Japan and S. America. In Australia the most familiar genera are *Banksia*, *Hakea*, *Persoonia*, *Telopea* and *Grevillea*. Of about 30 genera, 10 are represented in Vic-

toria. The family is placed by botanists among the plants whose perianth (floral envelope), shows a low form of development. Among Dicotyledons the families are arranged thus:—CASUARINACEAE, MORACEAE, URTICACEAE, PROTEACEAE, and after these SANTALACEAE, LORANTHACEAE, etc., finishing with plants having a more highly developed perianth, GOODENIACEAE and COMPOSITAE. Casuarinas and the next two families have a small, bract-like perianth. Then comes PROTEACEAE, in which the perianth is simple, petaloid and deciduous, with four segments and anthers sessile near the ends of the segments. *Banksia* is named after Sir Joseph Banks, *Hakea* after Baron Hake (Hanover), and *Grevillea* after the Rt. Hon. Charles Greville, of Paddington, a patron of Horticulture.

With the exception of three or four species which are found in New Caledonia, the genus *Grevillea* is confined to Australia, 156 species were enumerated by Bentham in his *Flora Aust.*, and 20 of these are found in Victoria.

The number has now been brought up to 203, if the two species in this contribution are included. It is interesting to note that of these, 165 are endemic in one State, 27 are confined to two States, five to three States, five to four States, and one to five States. Of the 165 above, 113 are endemic in West Australia, four in South Australia, four in Victoria, 24 in New South Wales, six in Queensland, and 14 in Northern Territory. Tasmania has only one *Grevillea* (*G. australis*, R.Br.), which also occurs in N.S.W. and Victoria. Of the 47 species added, only 10 are from States outside West Australia. Of the 20 species recorded for Victoria in Bentham's *Flora*, three (*brevifolia*, *ericifolia*, and *divaricata*) have been reduced to varieties, and *floribunda* has been dropped, so that as four species have been added, *ramosissima* (a New South Wales species), *Williamsonii*, *chrysophaea* and *polybracteata*, the number remains at 20. As may be expected, such a large genus is much in need of revision, and the author's short study of all available specimens, by the courtesy of the officers of the National Herbarium, indicates that the botanists of the last century left many species in doubt. The wonder is that so many species are incontrovertible. When one turns over the dried specimens, one cannot fail to realise some of the beauty of these interesting plants, and to regret that in our gardens so few of the glorious masses of bloom of Australian *Grevilleas* are to be seen.

NOTES ON SOME BIRDS AT PORT ALBERT.

BY D. DICKISON.

While on a brief visit to Port Albert last Easter (April 15th-18th), I devoted much time in observing the habits of some of the aquatic birds which existed there in large numbers. The locality, with its extensive mud flats, is suitably adapted for members of the Charadriidae family (waders), and when the tide recedes a large stretch of marsh land is made available as feeding grounds for these birds. Numerous mudbanks are scattered throughout the whole of the bay, and with the fall of the tide large flocks of birds, particularly Black Swans, congregate on these banks to feed upon minute sea life that has been left stranded by the falling tide. Black Swans (*Chenopsis atrata*). These birds numbered many thousands, and generally remained in the vicinity of the mudbanks, seldom approaching the shore at all. Just on sunset large numbers used to take flight to seek fresh water at some of the inland lagoons. It was apparent that they fed mostly during the morning and late afternoon, and rested for a few hours about mid-day.

Dottrels. Only two species inhabited the shores, but both were plentiful in numbers. The double-banded Dottrel (*Charadrius bicinctus*) congregated in small flocks, and when followed would travel for over four hundred yards along the water's edge before taking flight over the water, and returning to their favored strip of beach. These birds had already donned their winter plumage, at which time the conspicuous band on the lower chest becomes very indistinct. The other species was the Red-capped Dottrel (*Charadrius ruficapillus*), a much smaller bird, but often associating with the former. It is a pretty little form, with pure white underneath and a red cap, and seems to prefer to use its legs as means of avoiding danger more than its wings.

Australian Curlew (*Numenius cyanopus*). Nearly every mudbank was inhabited by a few of these wary birds, but seemingly the majority had already left on their flight to Asia, where, no doubt, the remaining birds would soon be wending their way. There is a great similarity in the flight of the Curlew with that of the Brown Hawk. Both birds usually fly low and direct; the beat and shape of the wings while in flight are alike, but with the Curlew its flight is faster.

The Sharp-tailed Sandpiper (*Erolia acuminata*) was another Northern bird that was ready for its long flight.

Only one flock of between 20 and 30 birds was seen, and these were constantly on the wing. An interesting thing concerning these birds is their wonderful powers of manoeuvring whilst in flight. They rise from the ground almost mechanically, fly rapidly through the air, turning sharply at short distances, but keeping close together all the time, and when settling every bird appears to land simultaneously.

Pied Oystercatcher (*Haematopus ostralegus*).—These lovers of lonely shores were noted in small parties in some of the inlets. Unfortunately, they were not numerous, and like most shore birds, were extremely shy. Once disturbed, they would fly a considerable distance before settling again. Both here and on Phillip Island the Black Oystercatcher was absent. It is apparent that this bird is either becoming rare, or is restricted to small isolated parts along the Victorian coast.

Several fine specimens of Pacific Gulls (*Gabianus pacificus*) were in evidence around the wharf near the township. Mostly they were in immature plumage, but occasionally a full plumaged bird made its appearance. It is not until they reach four years of age that the young birds lose their brown mottled plumage, and gain the beautiful blue and white dress. As the number of brown plumaged birds exceed those in adult attire by five or six to one, it is evident that the life of a gull is not a long one. This bird is a voracious feeder, ever eager to pick up morsels left by fishing parties, and at times it even tries to rob Silver Gulls of food from their bills.

The Silver Gull (*Larus novae-hollandiae*) is also a very common bird in that part. Owing to the pugnacious habits of the Pacific species this bird is often attacked whenever it ventures too near its larger congener. They obtain their food largely from the backyards of the houses in the town, as on a few occasions as many as twenty birds were seen fighting for scraps in fowlyards.

THE DRAGON LIZARDS.

Some time ago it will be remembered that an aviator on his flight to Australia mentioned seeing on route the strange Dragon Lizard peculiar to an island in the East Indies.

An expedition was sent out to the island, Komodo, by the American Museum, and several specimens were obtained, and a most interesting motion-picture of the grotesque creatures in their haunts was secured, and is now being shown to illustrate a lecture on "The Dragon Lizards of Komodo," the receipts from which are reserved for an Experimental Research Fund.

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FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Queen's Hall, 181 Collins-street, on Monday, September 12th, 1927. The President, Mr. E. E. Pescott, occupied the chair, and about 70 members and visitors were present.

DECEASED MEMBERS.

The President referred to the death of Mr. E. R. Hammett, an old member of the Club, and that of Miss Keartland, sister of the late Mr. G. A. Keartland, also a member, and requested those present to stand as a mark of respect. It was resolved that letters of condolence be written to the relatives of the deceased members.

CORRESPONDENCE.

From Mr. W. Stawell, regarding destruction of the Tea-tree and Banksias near Rickett's Point, beyond Sandringham.

From Victorian Railways, advising particulars of a special tour of inspection to Yallourn on September 22nd, and inviting applications for booking.

From Field Naturalists' Section of the Royal Society of South Australia, asking for wild flowers for the Show to be held on September 23rd and 24th.

Messrs. J. W. Audas and A. E. Keep undertook to collect and forward a supply of wild flowers to South Australia.

REPORTS.

Reports of excursions were given as follow:—Wattle Glen, Mr. L. L. Hodgson; Greensborough, Mr. A. J. Tadgell; South Warrandyte, Mr. F. G. A. Barnard; Fish Hatcheries (Studley Park), Mr. L. L. Hodgson.

ELECTION OF MEMBERS.

The following were elected as ordinary members:—Miss Alice Slape, 14 Vincent-street, Malvern; Mr. R. D. Elliott, Toorak-road, Toorak; Mr. S. R. Mitchell, Glen Iris-road, South Camberwell; Miss Reta Murrell, 35 Royal-parade, Parkville; and Mrs. A. L. Lawes, 17 Lansdowne-street, East Melbourne; and as country members: Miss Ada Beal, "Llandu," Lorne; Mr. Ernest M. Homann, Technical School, Wonthaggi; Mr. R. F. Lush,

"Oakwood," Camperdown; and Mr. Robert Hall, C.M.Z.S., Orchard Close, Waimea-avenue, Hobart.

GENERAL.

It was decided that a letter be written to Mr. Chas. French, Senior, congratulating him on the attainment of his 88th birthday.

The Secretary was requested to convey to Mr. F. Chapman, A.L.S., F.R.M.S., the congratulations of Club members on his appointment to an important position in the Federal Government service.

Mr. A. S. Kenyon referred to the necessity of a uniform method of control of the aborigines, and submitted the following motion:—"That this Club write to the Royal Commission on Commonwealth Constitution, urging that it consider the question of bringing the control of the Australian aborigines under the Commonwealth of Australia." This motion was seconded by Mr. C. Daley, B.A., F.L.S., and supported by Messrs. A. E. Keep and A. L. Scott. Mr. Lance Le Souef spoke of the difficulties surrounding the question. The motion, on being put to the meeting, was carried unanimously.

Dr. H. Flecker referred to the recent report of the shooting of a whale, on the Victorian coast. He considered that action should be taken to ensure the protection of these animals, which were becoming scarce. It was decided to refer the matter to the committee for consideration.

The President drew attention to the samples of the new Club badge adopted by the Committee, which were available for inspection.

TEA-TREE INVESTIGATION.

The President, in referring to the report on the Tea-tree investigation, stated that this had been based on the reports of the several parties engaged on the various sections of the foreshore, and stressed the importance of approaching the Government with a view to restorative measures being taken before the growth finally disappeared.

Rev. W. C. Tippet, Mr. A. S. Kenyon, and Mr. Chas. Barrett also spoke on various aspects of the question.

Mr. L. L. Hodgson submitted the following motion:—"That the Committee of this Club be empowered to take the necessary action to approach the Government in regard to the control of the foreshore being vested in one corporate body, instead of such control being divided, as at present."

This motion was seconded by Mr. C. J. Gabriel, and was carried unanimously.

A series of lantern slides, showing the Tea-tree in various stages of growth and decay, was displayed, in addition to a selection of coloured views depicting orchids and native flowers.

EXHIBITS.

By Mr. C. J. Gabriel.—(1) Flowering specimens (from Grampians) of *Boronia pinnata*, Sm., *Boronia pilosa*, Labill.; *Bauera sessiliflora*, F.v.M.; *Thryptomenes calycina*, Stapf., *Grevillea oleoides*, Sieb., *Pultenea subalpina*, F.v.M.; (2) Marine shells—*Macrocallista erycina*, Linn. (Ceylon), *Pitaria lupanaria*, Lesson (C. America), and *Pitaria dione*, Lesson (C. America); (3) Land shells from Grampians, *Chloritis Victoris*, Cox.

By Mr. C. H. Borch.—Four species of Victorian Geometridæ (loopers), familiarly known as Silver Wattle Moths, showing also larvae of one of them (*Thalaina punctilinea*).

By Mr. T. Kerr (Echuca).—Specimens of *Acacia acinacea* (Gold-dust Acacia), *Loranthus quandong* (Grey Mistletoe), and *Exocarpus spartea* (Broom Balart) from Echuca.

By Miss Currie (Lardner).—Specimens of native flowers from Lardner, Gippsland.

By Mr. C. French, Junr.—Case of insects—species that attack Tea-tree, etc.

By Mr. H. McColl.—Specimens of cultivated native flowers—Three *Hardenbergias*, *Grevillea rosemarinifolia*, *Eriostemon myoporoides*, and *Eugenia Smithii*.

By Mr. L. L. Hodgson.—(1) Cultivated specimens of *Acacia leptosa* (Leper Acacia), *A. prominens* (Golden-rain Wattle), *A. spectabilis*, *Hardenbergia monophylla* (Purple Coral Pea), *Micromyrtus ciliatus* (Fringed Heath-myrtle), *Grevillea rosemarinifolia* (Rosemary Grevillea), *Grevillea asplenifolia*, and *Chorizema illiciifolia*. (2) Photographs of White-browed Babbler (*Pomatorostomus temporalis*) and nest, exhibited on behalf of Mr. Alex. D. Selby, of Quantong. (3) Wire nest of Magpie, exhibited on behalf of Mr. James Hill, of Murtoa.

By Dr. H. Flecker.—Specimens of Tobernite and Autunite from Mt. Painter, Flinders Range, South Australia (copper and calcium uranium phosphates), very rich in radium, for which they are mined.

AUSTRALIAN LAND SHELLS.

BY SIDNEY WM. JACKSON, R.A.O.U.

Many of the Australian snails have shells of great beauty, and are deeply interesting. But few kinds are common; and most people are familiar only with the alien garden snail, *Helix aspersa*, which was introduced, accidentally, by Quoy and Gaimard. The eggs were in the soil of pot plants which the two French naturalists brought out to Australia.

Our land shells, especially the smaller forms, are not found without much patient hunting. More than thirty years of field work has enabled me to collect thousands of specimens, including a large number new to science. The smaller the shell, the rarer and more interesting is the species. I seldom make a trip into the forests, scrubs, or jungles, without finding some small, undescribed species.

In Australia we have several hundred species of land shells, ranging from the tiny *Helix microcosmus*, to the large and beautiful *Panda falconari*, a shell nearly as large as a man's closed fist. - The shell of the latter species varies in size, in different localities, and at different altitudes. The higher the elevation the smaller the shell. On Macpherson Range, in south-eastern Queensland, at an altitude of nearly 4,000 feet, I found in the dense jungles, shells of *Panda falconari* just one-third the size of shells of the same species collected on the Tweed River, some twelve miles further south, and at an elevation of about 300 feet or 400 feet.

At high elevations, in particular, I observed that blowflies, *Calliphora*, sp., play great havoc with land shells, by depositing their eggs or larvæ in the small openings through which the snail breathes. The larvæ quickly make their way down into the body of the snail, and devour its kidneys. This, of course, causes the snail to become a "cripple"; it loses completely the power of travelling or moving about, and remains in a half-dead state for many days. When it dies, the body is eaten by many fly larvæ. Hence the number of dead and empty shells found in the jungles, and possessing rather perfect and unbleached surfaces. I have met with, and examined, many land molluscs, of numerous species, in a dying condition. The parasitising of land molluscs by blowflies was also noted by the late Sir Arthur Shipley, in England. The best time to hunt for land shells is a

few weeks after rain has fallen, and the ground generally has had a chance to become dry again. "One can then find and hunt in the spots remaining damp, to which the snails have retreated. Hunting during wet weather is not nearly so satisfactory, as all parts of the locality are damp, and you cannot discover a proper "camp" for molluscs. Search for shells under bark at the base of trees; under decayed wood, beneath stones, logs, masses of dead leaves, etc. Many species live on the trunks, and the foliage of trees, such snails as the beautiful *Helix macgillivrayi*, and also numerous very tiny species.

Bush fires and the great advance of agricultural settlement are responsible for the extermination of some species.

We possess many beautiful and remarkable forms. *Panda Whitei*, I discovered in the dense jungles west of Mackay, North Queensland, in September, 1908; and had it named, by the late Dr. Charles Hedley, F.L.S., in compliment to my friend, the late Mr. Henry Luke White, of Belltrees, Scone, N.S.W., who did so much to advance our knowledge of the ornithology of Australia.

The Bower-birds of Australia use dead land shells in the decoration of their play-grounds. The Great Bower-bird, *Chlamydera nuchalis*, uses large quantities of shells. I have counted as many as 100 in one play-ground, on the Atherton tableland, North Queensland. Through carefully examining the play-grounds of the various species of Bower-birds, I have been assisted in discovering new species of land shells. In the bowers small pieces of shell were noted at times; and I hunted the locality until I found the living and perfect shells. This has happened frequently. Such was the case, for example, with the beautiful and delicate *Panda Whitei*.

Land molluscs are nocturnal, and I have collected many as they moved about late at night, in the Queensland jungles. Traps, potato peelings, etc., can be placed for them at likely spots. I have found numbers in the bush at night in this manner.

"Live" shells should be boiled for a few moments, and the animals immediately picked out carefully with a strong bent pin. Never dry them in or near the sun; place them on a towel and dry in a room in the shade; this prevents the bright and glossy interior portion of the shell from becoming white and dull. I have cleaned

many thousands, and have collected them in every State in the Commonwealth, including islands off our coast. Care should be exercised in removing the animal from the shell after boiling. Dirty and untidy specimens spoil a collection, and only harbor vermin. Careful data should be recorded with each specimen. Very small species should be kept in glass tubes.

Accompanying this article is a photograph taken by myself, showing the "feeding ground" of the Kookaburra, *Dacelo gigas*, the Cat Bird, *Aeluroedus viridis*, and the Noisy Pitta or Dragoom Bird, *Pitta strepitans*, in the Hoop Pine, *Aracaria cunninghamii*, scrubs, at Coolabunia, near Kingaroy, Queensland, during June, 1908. The great heap of land shells, *Helix cunninghami*, had all been broken by many birds of the species mentioned on the much-worn stone shown on the left side of the illustration. The back portion of each shell was broken, in order to allow the bird to extract the snail! The shells of these molluscs are large and rather flat, and measure more than two inches across. In this locality stones are very scarce, consequently the birds are compelled to carry the shells long distances to the "anvil" stone in order to break them. At one stone I counted more than 2,000 of these large shells scattered about, numerous old ones, and many that had quite recently been broken.

I found "live" shells on the ground, chiefly under masses of leaves and loose bark—the bark falls from the Hoop Pines, when dead, and gathers in heaps at the base of the trees.

When, with Mr. A. F. Basset-Hull, I visited the islands in Port Stephens, N.S.W., during January, 1910, numbers of Nankeen Night Herons, *Nycticorax caldonicus*, were breeding in the trees on Snapper Island; and on the plumage of many of these birds I discovered living a tiny species of land shell, *Achatenella jacksonensis*, (named after Port Jackson). This illustrates how small species of molluscs may be carried long distances from one island to another, by birds.

Just prior to our arrival, some ruthless plunderers had been on the islands, and shot hundreds of these beautiful birds, for the sake of obtaining the small white feathers that spring from the back of the head.

Recently, at Millgrove, near Warburton, in a few hours' hunt, I collected eight species of land shells, some large, and some very small. Lyre-birds must devour a great number of snails daily.

Plate VI.



Photo by Nat. W. Jackson.
Feeding-place of Kookaburra and other species, showing "unvil-stone" (on left), and snail shells broken by the birds.

VISIT TO NATIONAL MUSEUM.

Meeting at the National Museum on July 16, for a visit to the Fossil Galleries, the party of about 20 members was first taken to view the new group of the Giraffes and the *Okapi* in the main hall, in order better to appreciate the curious fossil forms of the Giraffidae exhibited upstairs. There it was seen, by specimens and diagrams, that the fossil genera, found in the Siwalik Hills of India, and in the Islands off Greece, although so distinct in general form, have in common the character of a split canine tooth.

Attention was mainly directed to the larger exhibits, those in the wall cases being selected for detailed demonstration. Amongst these were seen the well preserved foreign fossil plants, as the giant horsetails (*Calamites*), the later palaeozoic conifers, and the beautifully preserved leaves of such European plants as the Poplar, the Birch, the Lime and the Beech, all dating back nearly three million years.

Amongst the fossil shells we saw the large pearly *Nautilus* from Sheppey, presented by our fellow member, Mr. Cudmore, the gigantic turreted shell, *Cerithium*, from the Eocene of the Paris Basin, and the fine array of the Ammonites, some of which still show the delicate horny rostrum or hood. Scanning the fine series of fossil fishes, their chief evolutionary lines were traced, and it was seen that several of the existing groups, as the sharks and the lung-fishes, commenced their career many aeons ago.

Of the Fish-lizards, the Museum possesses probably the most complete collection in the southern hemisphere, and these afforded many points of discussion, as to their mode of life and their rapid evolution during a comparatively restricted geological time-range.

The evolution of the Elephants forms a fascinating subject, and by means of diagrams and the fine models of the Fayum specimens prepared by Dr. Andrews, it was seen that their evidence for progressive development was nearly complete. Their tooth structure was also enlarged upon, the modifications of which had resulted from changes in their environment.

The main features of the Australian collection of fossils were explained, and attention was drawn to the fine series of *Diprotodon* remains in the wall cases. In these

cases we especially noticed the gigantic ammonite forms that are found in Northern Queensland, as well as some other interesting cephalopods from the Tertiary beds of Mornington and Eastern Gippsland. Here were seen the giant Cowrie, the great Volutes, fossil sea-urchins, sea-mats, and other interesting Tertiary fossils, from the Murray River cliffs and Balcombe Bay; and also much older, palaeozoic fossils, such as the skeleton-like Graptolites which once floated along with the seaweed that drifted with the currents over the inky waters of the Ordovician seas.

In the table-cases many choice specimens were noted, as the delicate little crinoid (*Helicocrinus*) that was discovered in the Brunswick brick-pit in 1902. In the Jurassic series we saw the wonderful fossil ferns and cycads, many of them identical with those of the Jurassic beds of Yorkshire. It was intended also to examine some of the unexhibited fossils in the palaeontological office, but the time proving all too short, this was reserved for a future visit.—F.C.

EXCURSION TO GREENSBOROUGH.

Twenty-one persons formed the party on August 27th. Starting in an easterly direction, we crossed the railway by the bridge over the Plenty, and examined the river's shallows and surroundings. The bird men were soon following calls, and several of the party examined the physical features of the rocky banks. The Tree-Violet was found in abundant bloom; *Myoporum viscosum*, and the Swamp Callistemon, as well as several aquatic plants, were noted.

Proceeding north-westerly, we saw two semi-parasites in specimens of *Phrygilanthus elastroides* and *Loranthus pendulus*, and as the latter abounded in flowers and buds, an opportunity was afforded of explanation of the nature of the two genera under their later nomenclature. Greenhood orchids of three species were found. *Pterostylis nana* was abundant, one specimen having twin flowers of equal size and development. A double-flowering bract in a specimen of *P. curta* exhibited an interesting and unusual phase, as the leaf-like expansion stood out at an angle of 45 degrees from a common axis, with the bract enclosing the ovary; the second bract was the larger. Festoons of *Clematis microphylla* tempted the photographer to take a picture of the party with rich masses of the Traveller's Joy, as a fitting background.

The district was somewhat dry for the time of the year, and plant life rather backward. It was pleasing to see so many of the party listing the names of the 75 native, and 27 alien plants collected. Another feature was the interest evinced in the introduced flora, which often times is taken less heed of in our outings.—A. J. TADGELL.

THE HISTORY OF *FLORA AUSTRALIENSIS*.

BY CHAS. DALEY, B.A., F.L.S.

IV.

On the 24th November, 1864, Bentham wrote regretting the damage to specimens in transit to Australia, and the misunderstanding in regard to freight payments. He states that he has "very little time for writing letters except absolutely necessary correspondence," but continues at great length with information as to method of work, and some points raised in Mueller's letters:—

"Every description of my flora is written out at least twice over. The six hours' work I get in the middle of the day is fully taken up by the examination of plants and search into books—all the writing out for press has to be done at home in the morning and evening, then the proofs and revises, besides my annual addresses, various reviews and revision of papers, and I cannot entrust any of the writing or compiling to other hands even if I could afford it; so that it requires a great deal of courage after all that, and at my age to sit down to write letters, and I have written a great deal more to you than I ever expected to do.

"When I make any observations about money matters, it is not but that I fully recognise your liberality, as I stated in my preface, and there is never any thought in allusion to you and your government; but I always think that some of the other governments might have followed the example of yours. Out of the £250 I get, I have to pay £100 down to Reeve, then (not reckoning the copies which, by your desire, I have charged to you), I take 12 copies on my own account to give to those who have assisted me with specimens, etc. . . .

"I have much to pay in carriage of specimens from the continent, in postage and various minor expenses attending on the work, so that on the whole I scarcely clear £125 per volume, which is very poor pay for a twelve-month hard work, after being nearly 40 years in the trade."

He mentions having commenced the *Myrtaceae*, and has finished *Leguminosae*, after which he continues:—

"Thanks for your notes on my second volume. I have not made up my mind about supplements. Repeated supplements and addenda to supplements are practically very inconvenient, and I think that my time is more usefully occupied in continuing the body of the work. Numbers of criticisms will, of course, be made on the published volumes; errors pointed out, and additions made. All these I shall take a note of, and if life and strength are spared to me to bring the work to a conclusion, embody them all in one general supplement.

"With regard to the delimitation of genera and species, every botanist has his own opinion, and no one is of sufficient authority for others to defer to except in some cases—Brown and de Candolle. I come to the best conclusion that I can, but I do not in the least expect you to agree with me. I am

often in very great doubt myself, and an additional specimen or a different chain of thought may turn the vote one way or another. Our acquaintance with species, is at best very imperfect; the greater part of the facts we state are more or less conjectural, and scarcely anything in botany is capable of mathematical demonstration.

"You find, I admit, far too many species. You may be perfectly right; on the other hand, botanists of as great, or greater, experience than myself, and on whose judgment I place the greatest reliance, think that I unite too many species—and they may be right, too. All I can do is to act to the best of my judgment, fully admitting its great fallibility.

"The idea that true species are entirely limited in nature, which you insist on so strongly, is one that I long maintained in opposition to Alphonse de Candolle, W. Hooker, and others, whose views on subjects of the kind are founded on more general knowledge than I can boast of, and I now find that my own opinions are much shaken, the spirit of enquiry awakened by Darwin's extraordinary labours has thrown so much light (comparatively speaking), on the history of biological succession as to break down all absolute tests of a species, and there are very few naturalists of ability who would venture to specify the absolute differences between a species, a race, and a variety. It is in each case a question of nice appreciation, which must vary with the constitution of every mind, and one must have a strong conviction to set up one's own opinion against that of the majority of experienced botanists.

"Genera, the more we know of them, prove to be still more arbitrary. There is scarcely a single large genus in *Leguminosae* that is clearly defined from adjoining ones; intermediate species are always found sooner or later. *Myrtelia* is a very bad genus, although it has a technical character. *Oxylobium* passes as much into *Gastrolobium* as into *Chorizanthe*, and *Oxylobium* and *Pultenaea*, this again into *Dilwynnia*, and so on, and so on, almost all through the Australian *Podalyriaceae*, which might have made one, or at most, two genera. *Cratolaria* passes into *Lotononis*, and many others; *Tephrosia*, with *Millettia* and many other Robinoid genera, *Sesuvium* into *Lepellea*, and through various degrees into *Coletea*, and no quite constant character separates them from *Astragalus*, *Corayanae*.

"But to assist the human mind we must make genera which are better or worse according to the ability of him who defines them. I have no pretensions to doing better than others. I do the best I can, often giving up my own ideas for what I conceive to be the general judgment of those of more experience than myself.

"I see you object to some of the specific names I have taken up—as to MS. ones, I have always given up my own, although recorded in several herbaria for yours; but, when specific names are published, it is a rule which de Candolle and several other botanists more than ever insist on, that, when a species is removed from one genus to another, the oldest specific name is to be retained without very strong reasons to the contrary; and, if I were not to do so, it would certainly be done for me by the first who should follow me."

On February 26th, 1865, he mentions that Mr. Kippit had told him that Dr. Mueller had said that Mr. Bentham would propose Dr. Woolls, of Sydney, as a Fellow of the Linnean Society, but no mention of it had been made in Mueller's letter.

He writes, evidently under a sense of unusual irritation at some candid comment or criticisms made by Mueller on the second volume of the Flora:—

"I am much obliged to you for your corrections to my Flora, which I note in my interleaved copy for the Supplement, if ever life and health be spared to complete the work. We all commit blunders, and make false determinations, . . . overlooking articles and observations scattered over the extensive botanical literature; and I am very thankful I have mine pointed out and corrected, as I am accustomed to do the same to others without taking, or dreaming of giving offence. . . .

"With the extensive collections of authentic specimens at hand, we have superior means of identifying plants than many others, and therefore I have been more communicative about identification than I ought to have been; but it was all with the best intention, and as to a true description of genera and of species, it is now a settled thing that no two naturalists ever agree on the subject.

"I regret very much, however, that you have found reason to be so thoroughly dissatisfied with the execution of my second volume, that you find my genera miserable, my delineation of species often ridiculous, and my diagnosis unavailing for practical use. I do my best, and, as I am now pledged to continue the work, I shall persevere as long as I am able; and trust that, notwithstanding my failure, you will continue to give me your valuable assistance."

Opposite to the preceding paragraph is written in denial in the original letter a vigorous "No. F.M." Bentham writes that he is working at *Chamaeleuca*, *Baeckia*, *Lhotskya*, *Thryptomene*, finding them very involved, and he details the differences in the determinative factors.

"I am getting quite tired of these troublesome little flowers. I have repeated the analysis of these minute parts over and over again before I could be satisfied." He hopes to get *Compositae* in the third volume.

On March 26th he mentions that he anticipates little difficulty from the Orders, *Cucurbitaceae* and *Parviflorae*, as they had been worked upon by Dr. Hooker and Naudin.

The treatment of *Myrtaceae* proceeds very slowly. There are vast numbers of species of an order comparatively new to him, and there is a "multiplication of species of *Leptospermum*." "I am much at a loss where to stop with the uniting of them, for the whole genus seems to me to show a gradual passage from the one to

the other, and yet I feel it would never do to unite them all into one species." He has finished *Kunzeu*.

On April 25th he writes, "I wish you would continue and complete your great work on the Victorian Flora, which is certainly your best and most useful way of correcting the errors of my flora, besides that, its completion would be the greatest credit to yourself. You say I ought to extend my descriptions more, for I have overlooked cardinal characters. If I have done so, it is not from shortening descriptions, but with not having drawn them up with sufficient care, notwithstanding the pains I have taken. Descriptions of the length I give them ought to include everything essential; whether they do or not depends upon the ability of the author; and you know as well as anyone else how very much easier it is to write a *long* description than a short one, but how much more practically useful to the botanist is a short than a long one."

On July 23rd he announces that he has already written out the *Myrtaceae*, with its 570 species, except *Eucalyptus*, containing 100 species. He remarks:—"It will take me the whole winter to finish the third volume." In regard to the extensive and difficult Order of *Eucalypts*, replying to a request of Mueller for detailed descriptions, he writes, "I cannot indeed undertake the elaborate details of this genus which you propose; that cannot be done on dried specimens alone (which in this genus are necessarily imperfect). All I can do is to identify as much as possible old published species, and give such an enumeration of them as I can compile. I had been in hopes that you would have monographed the genus before I came to it; and now I must leave it to you to prepare a complete monograph, with proper illustrations, which can only be properly done in the country with your means and talents, and which you may make a lasting monument to your memory."

On September 21st, 1865, Bentham refers to Sir William Hooker's death on 12th August, and to Dr. Hooker's illness. He makes the important suggestion, "It would be a great convenience if you were to give a systematic Index to the plants described or commented on in your *Fragmenta*, and other papers; for it takes a good deal of time to hunt up the scattered notices; and, after all, there is a great risk of missing some, as is unavoidable in regard to the notices of Australian plants occasionally

issued on the continent,"—a practice to which Dr. Mueller was somewhat addicted.

On October 18th he again refers to the difficulty of working on the genus, *Eucalyptus*.

"The anthers are frequently a good character, but often difficult to observe; venation a very constant one in most cases, but very difficult to describe; the bark character may be excellent, but unfortunately in most cases unavailable. Parallel distinct anther-cells generally go with regular, numerous, diverging veins; divergent, confluent, anther-cells with irregular, very oblique veins. The shape of the fruit is better, I think, if we get it properly developed and ripened.

"In short, after I have done the genera it will require your doing it over again in the country where you can ascertain many particulars that the specimens do not show, and which your experience will give you there. I hope you will work up a detailed monograph of *Eucalypts*, with their practical qualities, and give figures of all, at least of the useful and prominent species. That would be a noble work which none but yourself could do properly, and my present labour will only be useful in identifying the old species.

On November 19th he is still engaged on the *Eucalypts*:—

"I have now been six weeks steadily working at *Eucalypts*, and I have only just begun upon the Western species. I have grouped them as well as I am able, chiefly from the anthers, inflorescence, and fruit, but am not at all satisfied with my arrangement. The bark may, as you say, give good characters, but wholly unavailable to me, as the specimens never show it, and the notes of collectors, when given, are most bewildering, especially for those who have never seen the trees growing, and the majority of the specimens are unaccompanied by any note of the bark. I suppose I have another month's work with them. I shall then revise the *Myrtaceae*, and go on with the following Orders."

".... At my age, with the little time, I am likely to have before me for work, I think it best bestowed in getting on as much as I can with the consolidation of old and new species, so as in my flora to establish a groundwork for the future elaboration of a more detailed and accurate and comprehensive account of Australian plants in which you will be able to apply with advantage your acquaintance with the living individuals, which I have always found so important in my work on the European flora."

It was not until January 18th, 1866, that Bentham could report, "After three months' close work, and quite tired of going over and over again intermediate specimens of the principal species, I at length got through *Eucalyptus* at Xmas." Again, on 18th February, "I have at length finished the revision of *Myrtaceae* with Brown's splendid collection."

In March he intimates his intention not to do supplementary work which can be put into Mueller's *Frag-*

menta or other works. By April he has got through *Oleuria* for the next volume, and estimates that the cost of including a map of Australia would be from £30 to £40. The Composites are a relief after the Myrtaceous Order. "I get on so much quicker with *Compositae* from their not requiring boiling,—as the Myrtaceae do. Cold water soon moistens them sufficiently." He estimates 700 pages for the next volume. His other work, *Genera Plantarum* is still in progress.

He expresses satisfaction on July 22nd, 1866, that the Eucalypts had arrived safely on return to Australia. The recent wreck of the *London* in the Bay of Biscay had made him uneasy. He wants the remaining *Compositae*, of which there is only a little to complete, 400 species being done.

"So far as I have gone, I have been able (pretty well to my own satisfaction, although very likely not to that of others) very much to reduce the small genera." The 30 odd genera were reduced to 5:—*Myriocephalus*, *Angianthus*, *Gnephosis*, *Calocephalus*, and *Craspedia*. He states that Australian Composites resolve into groups, of which *Helichrysum* is probably the worst.

Bentham's eagerness to finish the *Compositae* and his pardonable impatience at the delay in receiving the remaining species, as expressed in his last letter to Mueller, seem to have been somewhat displeasing to the latter, for in an explanatory reply written to Bentham, 26th August, 1866, he states, "By last mail, dear Mr. Bentham, I did inform you that I had shipped the rest of the *Compositae* by the *Yorkshire*, which ship left on the 21st July. It was one box, chiefly containing *Gnaphaloideae*, in all 23 parcels. In my letter by last mail, I alluded more specially to the unusual circumstance which caused the detention, and I enclose a copy of a portion of that letter, since I have received your note dated 18th June, to which I now briefly reply."

Your respectfully,

Attached,

FERD. MUELLER.

An addendum to this letter was attached, which Mueller evidently, on further consideration, endorsed, "not to be sent." It is of interest, however, in showing more clearly the writer's attitude of mind, sensitive to what he probably considered an implied reproof at the delay in forwarding the specimens referred to. He

acknowledges the receipt of proof-sheets, congratulates Bentham on the care and arrangement bestowed on the Eucalypts, on which order he is forwarding some notes. He deprecates undue haste, as he has had much unexpected extra work, and if the Flora fore-runs the Genera he is describing, the result is unsatisfactory. He has sent Drummond's plants after re-arrangement. Goodeniaceae and Lobeliaceae will be sent at the end of the year.

Part of the addendum above-mentioned is as follows:

"My firm conviction is that a few years' delay would have been most advantageous for the elucidation . . . of the flora, the first volume being already very incomplete, and a very few years would have sufficed to render known the rich North-east. Governments are not constantly inclined to support work of this class; and, were I to attempt after a few years a new edition, I should get probably no support from the State; and I could probably neither here nor at home find a publisher, while the printing at our Government Office would probably not be allowed for the sake of economy. In Australia there seems as yet no call whatever for the work. There is seen never once yet a single copy in any of the many large bookshops of Victoria. This owes not, perhaps, so much to the want of interest, but to the circumstances that in a young bustling community no one has leisure to look far beyond the ordinary calls of life. In Europe to most the delay of the publication would have been no hardship, considering that Robert Brown made so little use of the material for upwards of fifty years. What a pity I ever worked on the Flora of Australia now almost in vain."

One cannot echo the pessimistic reflection that concludes the statement.

Bentham had returned after holidays to find that the remaining Composites had not yet arrived, and again, in a letter dated September 25th, 1866, expressed his disappointment.

"I am exceedingly anxious to proceed rapidly with the Flora, as I feel that at my age I may any day have to strike work, and I know of no young botanist here ready to take it up upon my failing. *Genera Plantarum* is in excellent train in Dr. Hooker's hands, but neither he nor anyone else I know has time for the tedious working up of species necessary for the Flora." With customary candour he says, "I may be wrong in genera as well as in species, but still I hope I shall have cleared the way in establishing the synonyms of the majority of old species, and leaving tolerably authentic types both in your and in our collections to guide those who may hereafter undertake an improved flora of Australia."

Material for the next volume is wanted, and *Gamopetalae* is to follow *Compositae*.

From London, on December 19th, he announces the completion of the third volume, and sends the remaining sheets. "The whole volume will be out next week. . . . I hope you will not be dissatisfied with the volume. . . . it has cost me twice the labour of either of the others, having been close at it for two years, although the number of species is only 1,430. . . . I know very well that there will be much to correct and improve, and I may have been mistaken in many of my views, but I have done my best, and shall continue to do so as long as I have health and strength." He adds, "half the work is done," and that he should finish in six volumes.

"I wish that you, who are so thoroughly acquainted with the different types of vegetation in Australia, would prepare a paper for our Linnean Society on the subject—with some account of the physical characteristics, the geographical extent and position, and the prevailing species in each of the principal regions of vegetation in Australia without reference to political demarcation, so as to give us who have never seen the country an idea of its botanical aspect. This, especially if illustrated with an outline map on a small scale, in which the botanical regions might be generally indicated, would be an important contribution to science, and none could work it out so easily and so well as yourself."

From a letter sent from Willon Place, London, on April 19th, 1867, it appears that after the publication of Volume III. little had been done. Bentham had received *Campanulaceae* and *Lobeliaceae*. As the whole of the progress part of *Genera Plantarum* was in the printer's hands, he would now have more time for the *Flora Australiensis*; but he was going to the Paris Exhibition, and on a continental tour first. He mentions meeting Mr. Moore, of the Sydney Botanical Gardens, also that the late Sir William Hooker's Herbarium and Library were now definitely made over to the National Establishment at Kew, which was by far the most extensive, and in the most complete working order of any in Europe.

On June 17th he advises that he is going to Germany, and will be home in September to continue the *Flora Australiensis*. He hopes the *Monopetalae* will be at Kew ready for him.

"I see no great difficulties, and there are few (specimens) that require the tedious boiling of the *Myrtaceae*. The great difficulty will be the delimitation of species:—their division is carried further by Robert Brown than I

should be disposed to admit, and still further by many eminent botanists whose views one does not like to neglect, although one feels one cannot follow them."

On September 17th, he was back at Wilton Place, and had started on the *Goodenias* and *Stylidiiums*. After an exceedingly agreeable holiday in Germany he purposes going on steadily with the *Flora* without further interruption until the fourth volume is finished.

On October 19th he announces to Dr. Mueller, who, after an illness, had taken a brief holiday, that he had reduced *Stylidiaceae* to these—82 *Stylidium*; ? *Levenhookia*, 1 *Zostera*. Total, 90. To keep specimens in good condition a hot sun is required in summer, a good fire in winter. At this time an order for £100 was due, but owing to a Government deadlock in Victoria, no public funds were available.

Acknowledging receipt of plants on November 17th, he states that Drummond's collection among them is badly or uncertainly numbered. In regard to De Vreise's Monograph he writes, "Has given one name to five species belonging to three Natural Orders. Generic characters sometimes belong to only a small portion of the species he puts under them. He quotes the same specimens for two different species. He describes one plant and figures another."

He writes on December 19th:—

"I do not like suppressing a genus so universally adopted as *Leucopogon*; and, if it is retained as a section, and proves at all a natural one, I cannot but think it better to leave it as a genus—there is a great difference between making a genus and keeping up one already made. If it can be done with propriety, I shall have less scruple in doing so, as I see you have provided for it by keeping up the section, and by naming all your new species *Leucopogon* as well as *Styphelia*; the effect of the double synonym is thus already created; and, whether a group be a section or genus is, in many cases, purely arbitrary—and in matters of doubt botanists at large would rather follow Brown than my *opus*."

At the beginning of the year 1868 work is centred on the *Epacridaceae*, the *Styphelia*, and allied groups, an interesting Order of plants. Mueller had, evidently, at this time, under the pressure of other work, suggested deferring the *Flora* for a period. Bentham writes that that he is too old to do that, and adds, "Your materials are, of course, of the greatest use to me; but, if you are unable to send them, I must do as well as can without." In regard to the *Genera Plantarum*, he admits that it has been a heavy expense to Hooker and himself.

"Hooker is young enough to hope to see the end of it." With the consciousness of failing energy, but with characteristic spirit and determination he affirms, "Whatever I undertake I wish to go through with. I promised, if possible, to publish a volume a year of the Flora; and, although I cannot quite do that, I must keep as near as possible to it."

On February 23rd, he hopes that Mueller's health has benefited by his trip to King George's Sound. He will await the arrival of the next box before finishing the *Epacrids*. Sonder's specimens are also expected, and some *Monopetales* are still to come. The fifth volume will contain the *Monochlamydeae*.

"Now that I have got into the Orders contained in Brown's *Prodromus*, I see still greater urgency in going through the identification which present circumstances favour, and which I consider the important part of my work."

"With regard to the description and arrangement, . . . I know well that, with the advantages you possess, you will be able to do it much more satisfactorily in such works as your *Victorian Plants*, but the identification of old species can only be done here. Brown's have been very much mistaken, partly from not having the plants he described and attributing his diagnosis to those which came nearest—partly from the insufficiency of short diagnoses when new species come to be compared,—in a few instances (in two at least), from misprints in Nees's edition of the *Prodromus*.

"The *Epacrids* have given me a great deal of trouble owing to the minuteness of the ovaries. It is exceptionally difficult to hunt up the literature of modern systematic botany, and I much fear that I may have passed over a number of published species."

In an undated letter Bentham again urges—"Pray let me beg of you again on no account to name any species after me."

By May 14th, 1868, the expected box had arrived with *Stylidium*, *Goodenoviae* and *Epacridaceae*.

Bentham had gone through them, and packed them up with others for return from Kew. He mentions that all the *Monopetales* cannot be put in this volume; the *Labiatae* must stand over. He writes:—"I am afraid you will find much fault with the *Stylidium*, but the extreme delicacy of the Corolla prevents, in most cases, ascertaining its exact shape from dried specimens. In the *Epacrids* there was no such difficulty, only the great tedium of having to examine the minute ovaries of almost every specimen."

On July 12th he has despatched twelve sheets of the Flora, and more are in type. He is leaving London until the middle of September. The volume just fin-

ished is to compensate for the extra bulk of the third volume.

"I shall not trouble you to send any more until you hear from me that I have begun on the fifth volume next year. It is very possible that I may sometimes, in the large parcels of some species in your collection, have let here and there a specimen out of place. I take what pains I can, but now and then a mistake may occur, and the specimens being loose in double sheets, I cannot turn them over so frequently and readily as ours, which, being fastened down in single sheets of stiff paper, can be turned over rapidly like the leaves of a book, besides I sometimes get bewildered in the great heap of specimens, and I trust to you to correct my mistakes."

He notifies, on December 4th, that the copies of Volume IV. have been sent out, and expresses the hope that Mueller will take up the projected work on the Eucalypts. He naively writes:—

"I perceive that Australian botanists are as little satisfied as I am with my classification of the genus, and I am very anxious to see your critical system properly worked out for the whole genus." He congratulates Mueller on having received the honor of C.M.G., in recognition of his work.

It was not until May 13th, 1869, that he spoke of resumption of work on the Flora at *Verbeniaceae*. Acknowledging the receipt in advance for £100 for the fifth volume, he writes, "If not completed the money will be returned."

In a letter, dated June 9th, he finds the *Myoporums* difficult, and discusses the points of the Order. By September 30th he is employed on the *Labiatae*.

In referring to the Doctor's new dignity of a baronetcy he writes, "I hope you are not particular about the *von*; for, although in Germany your order gives you a right as a German;—that is not the case here as an Englishman where *vons* are not the custom and not recognised; and, on observing that the Colonial Office do not give it to you, and enquiring there, we are told that in giving you the Commandership of St. Michael and St. George, they advisedly omitted the *von*, which is not English. For my own part, I attach no value whatever to these things."

On November, 1869, Bentham has had to stop work through an attack of sciatica. He has been doing the Orders *Plantagineae*, *Nyctagineae*, and *Phytolaceae*, and is now on *Chenopodium*. He admits being puzzled about some genera, and writes, "but that the gentlemen resident in Queensland and other settled districts should send you little sprigs with a single flower or bud, or

with none at all is what I think you ought to remonstrate against;—guessing at such puzzles only leads into errors of which you will find too many in my flora, even if there is not that excuse. Dallachy and others of your own collectors, as well as some of your correspondents send, on the other hand, satisfactory specimens which it is a pleasure to have to work upon."

On December 24, 1869, he writes: "Moquin has made a sad mess of *Amarantaceae* in the *Prodromus*—a great deal for want of examinable as much as of authentic specimens; and much also from taking for granted that characters observed in one species are the same in apparently similar ones." He will begin printing in February.

By January 20, 1870, Bentham had begun *Proteaceae* to conclude the fifth volume. Sympathetically he writes, "I was much concerned to see in your letter to Dr. Hooker that you had been subjected to annoyance in the attempt to place your botanic gardens in other hands. I trust that the intention will not be carried out. In the interest of science, that is your place, and it seems to me that it would be as unwise as unfair to take it from you. But, as with us, our present financial administration is very antagonistic to science. I suppose your colonial administrations are also given to anti-scientific ideas."

At this period in Melbourne there was a movement in the direction of making the Botanic Gardens more of a pleasure resort than a scientific aid. On February 17, 1870, Bentham again refers to this, "I sincerely trust, from what you wrote last mail to Dr. Hooker, that all your troubles about the direction of the Gardens are over."

"The war (Franco-Prussian) has not made as much havoc with scientific collections as we at first feared. The natural resources of the country are so great that could she succeed in obtaining a few years of quiet and security, all might yet go well again; and I do not think Germany is safe from internal dissensions when the excitement of victory is over."

By September 24, 1871, he had resumed work, and on that date and on November 23, again mentions Mueller's troubles, "Happy to hear from your letter to Dr. Hooker that you have got over your troubles that had annoyed you so long." Having finished *Compositae* for the *Genera Plantarum*, he is free to take up the sixth volume of *Flora Australiensis*. Next month he was working *Pimeleaceae*, and in reference to the transmis-

sion of the £100 for him from Victoria, he writes, "Nor do I feel entitled to it until I have advanced the work a little further."

A letter in January, 1872, is devoted to technical matters. He has received the seventh volume of the *Fragmenta*, and is engaged on *Euphorbiaceae*, on which he disagrees with Baillon's determinations. By the beginning of 1873 he has finished the sixth volume of the Flora. "I begin now to be very impatient to get to the end of the Flora, for I am old, and feel that my faculties may soon be impaired." On April 8, he writes, "I am very sorry to hear that you do not get quite right in your official position, but I sincerely trust all will be settled to your satisfaction."

(To be continued.)

EXCURSION TO SOUTH WARRANDYTE.

South Warrandyte was visited for the first time by the Club on Saturday, September 3rd. Nine members met the leader at Croydon Station, whence Messrs. A. E. Opperman and A. C. Chandler, residents, who had kindly offered to motor them to the locality to be visited, a distance of about three miles. We visited Mr. Opperman's garden, which contains several uncommon plants. The Geraldton Wax flower was in full bud, and the Nodding Blue-Lily, *Stypandra glauca*, in bloom. In the adjacent paddocks we searched for orchids. It was found that the season was rather late, but nearly a dozen species were identified, including *Duiris maculata*, *Pterostylis nutans*, *P. longifolia*, and *P. pedunculata*, *Caladenia carnea*, *C. Patersoni*, and *C. praecox*. These two genera have been so split up lately by the species-makers that possibly other species might have been identified, had many more blooms been gathered and examined with a pocket lens. The thanks of the Club are due to Mr. and Mrs. Opperman (South Warrandyte) and Mr. Chandler (Kilsyth) for their kindness to the party.—F. G. A. BARNARD.

NATURE STUDY EXPEDITIONS.

Every State, excepting Western Australia, will be represented in the expeditions to several of the islands at the southern end of the Great Barrier Reef in November and December next. The most favourable time of the year has been chosen for the visits: The weather should be fine, and seabirds will be nesting. Students of marine zoology will be afforded an exceptional opportunity for research work among the corals and coral animals during the month it is intended to be away. Special attention is to be paid by one section of the party to an investigation of the huge sharks and rays that inhabit the tropic seas. The expeditions, which are the third and fourth of a series of nature study excursions organized in recent years by Mr. E. F. Pollock, of Carrington-avenue, Strathfield, New South Wales, will leave Sydney by rail for Bundaberg, Queensland, on November 13th and December 27th, respectively. The second one has been specially timed to enable school teachers and others to make the trip during the summer vacation.



TEA-TREE NOTES.

A few years ago, in company with another Club member, the writer proceeded by boat to Sorrento, and we walked home round the coast to Elsternwick—the only way to get a comprehensive idea of our coastal fringe and its value.

The following extracts from unpublished notes on that walking tour will supplement the information already to hand regarding the Tea-tree.

"On the road to Rye, the scrub is very dense, the Tea-tree fully justifying its name as 'Sandstay'; Banksias, the Drooping She-oak, the Coast Acacia, the Honey-myrtle, the Kangaroo Apple in flower, and the Sea-box with white fruits grew amid the Tea-tree.

"Leaving Rye, we took the road to Dromana. Here the scrub is in its pristine state. Banksias grew well, and were the haunt of many wattle-birds, probably feeding also upon the berries of the Sea-box.

"After a welcome rest (at Rosebud) we went on to Dromana along the beach, the country here being heavily timbered with Eucalypts, She-oaks, Black Wattles, and Banksias, with Tea-tree fringing the shore.

"Leaving Mt. Martha we decided to push on to Mornington. The dense Tea-tree provided good shade, and with a little labor a delightfully shaded path for pedestrians might be cut from Mt. Martha to Mornington.

"At Frankston under the ever-blessed, friendly Tea-tree, we had a siesta in view of the shore for a couple of hours.

"After heavy sand for half-a-mile, we struck into an avenue about two chains from the road, and 8 or 10 feet wide, with Tea-tree branches meeting overhead, and the pathway carpeted with soft leaves over the sand, whilst flickering sunlight streamed through the foliage. The vista along this well-kept avenue is charming. Small scrub birds, wrens, robins, tits, creepers, etc., flit across it. A Java dove alights on the track. Occasionally, a fleeting glimpse of someone going to or returning from the beach nowhere far distant, is caught as they cross the track. Vehicles rumble along the road unseen from our sheltered path, stretching ahead in an unbroken aisle of leafy perspective.

"On a hot day this is the most delightful walk around the coast, and whoever conceived the idea of reserving it for pedestrians merits the the name of Benoni. The only persons we met—three workmen, mistook us for 'rabbits.' After tea at Seaforth, we resumed the 'cool sequestered' pathway till it ran out at Carrum Carrum.

"From here (Mordialloc) round to Mentone the Tea-tree still affords a fair amount of shade.

"From Beaumaris round to Hampton there is a good Tea-tree shelter; but as one gets nearer Melbourne there may be noticed

the distinct change in the character of the Tea-tree, which now mostly consists of old trees, whose tops become broken and the trees scraggy. We miss the young trees with lighter foliage springing up freely to replace the old trees. The young shoots get no chance, being trampled down or broken by the throng who frequent the beaches and camp in the Tea-tree scrub.

The closing paragraph of these unaltered notes reads:—"One naturally gets from such a trip distinct impressions; one—how exceedingly valuable the eastern fore-shore of the Bay is as a convenient and health-giving means of relaxation to city toilers of every degree; and, secondly, how extensively and whole-heartedly it is made use of from the Yarrakastho Rip.

"Another lasting impression is of the extreme value of the untentious Tea-tree; its pleasant shade and verdure; its protective power against wind and rain; its use in staying the shifting sand; also its abundant growth on the more unfrequented frontages to the coast, gradually dwindling to extinction nearer the metropolis. Every effort should be made to preserve this invaluable tree, the presence of which doubly enhances the usefulness of the sandy beaches. Here and there small plantations of young trees are enclosed, as at Sandringham, Black Rock, etc.; showing that its disappearance has been noticed, but the respective towns and shires should endeavour to preserve it in its natural growth, or regulate it as in the fine avenue from Frankston to Carrum." C.D.

A TRIBUTE TO TREES.

The effects of denuding a country of woody plants has the result of causing floods and droughts. Where the land is covered with some kind of woody vegetation, the soil loose and porous, the rain penetrates the sponge-like humus layer, and sinks more slowly into the soil and is saved; the remainder, reaching the bed of the creek gradually, can only advance slowly on account of the obstruction of the vegetation; therefore, floods are retarded. On the other hand, when hills and slopes are completely denuded of trees and "scrub," the strong heat of the sun absorbs the last particle of moisture, and burns the vegetation. A thunderstorm or rain descends and rushes unobstructed down the hillside, carrying with it part of the still remaining surface soil. A very small portion of the rain finds its way into the ground. Rushing along, the water carries destruction to the low-lying levels, where it cannot escape quickly. Here the mud is deposited, making the soil impervious. Depressions become stagnant pools, and, slowly evaporating, the water leaves all the salt it brought from the higher ground, and as this accumulates, the soil gradually becomes more sterile.

Denuding the land of all trees and shrubs under the idea of improving pasture and fields is not always beneficial, as man cannot maintain his existence with only the limited range of vegetable and animal life administered directly to his wants. All plants should not be destroyed, as grass will grow well, especially where moderate moisture prevails, in the shelter of suitably placed large trees. It is erroneous to assume that all good land must only be used for the growth of cereals, etc., for producing good and valuable timber similar land is equally necessary. For the drier parts of the Commonwealth, it would be advantageous if one-half of it were covered with trees. Shrubs and trees are the natural rejuvenators of the soil, and it is a mistake to eradicate all plants which are not useful for fodder.—J.W.A.

KANGAROOS ON SPERM-WHALE HEAD.

The large grey Kangaroos (*Macropus giganteus*) are becoming quite numerous on the Sperm Whale Head Peninsula, and often, in the early morning, some may be seen feeding close to our house. Walking through rushes near a swamp, I surprised a female Kangaroo with a young "joey." She bounded off, but halted at the summit of a rise, about 200 yards distant. Hearing her young one calling, (the sounds it made rather resembled the notes of the Gang-gang Cockatoo), she started back, but when I moved, retreated at a fair pace to the scrub, about half a mile away.

I decided to make friends with the "joey." Hearing me coming through the rushes, he apparently thought that I was his mother, and hopped clumsily toward me, but, becoming aware of his mistake, when at close quarters, he uttered some distressed cries, and gallantly charged, grasping one of my legs with his front paws. He knew well how to treat a foe; After stroking his head and ears for a few minutes, I departed. At noon I re-visited the spots and found the little chap nibbling herbage. Later he lay down on the sunny side of a tussock, and remained there, I think, during most of the afternoon. Although between 2 feet and 3 feet in height when standing erect, the "joey" was not very active in its movements, and perhaps had spent little time outside the mother's pouch.

Again, soon after sundown, I went round by the swamp, and stationed myself on the rise towards the scrub; I felt certain that the mother Kangaroo would return early. I took care to keep to the leeward of their usual track, to avoid my presence being detected. Just at dusk I saw the mother coming, fairly silently, up the other slope—stopping once, then on again to the top, where another halt was made. Having thoroughly viewed the surroundings, she went straight to her young one, and immediately I heard the latter's greeting call. Another noise made by the young Kangaroo was a curious spitting sound; probably it denoted fear, as he would do this if I moved about at a little distance. We often wonder what animals think of! That day must have seemed a long one to the mother Kangaroo, and I feel safe in saying that her thoughts must frequently have wandered to the "joey" in the rushes.—FRED. BARTON, Jnr.

BLUE WRENS IN SUBURBIA.

Judging by my own observations, and notes received from other nature lovers, the Superb Blue Wren, *Melurus cyaneus*, always a familiar bird, is increasing in numbers around Melbourne. All through winter I have had Blue Wrens in my garden (at Elsternwick), and one pair, at least, was feeding a brood in September. The nest was high in a tangle of Honeysuckle and other creepers, on lattice-work above a fence. Correspondents in other suburbs state that "Bluecaps" are among their garden residents, or are frequent visitors.

My Blue Wrens delight in the wildflower patch, where they find insects to their liking most abundant. Native plants, grown as a "medley," and not in formal plots, attract native birds more than garden flowers do—or one likes to fancy that Wild Nature accepts the invitation to bring birds that are not aliens to the corner given over to her plants.—C.B.]

EXCURSION TO WATTLE GLEN.

The outing to Wattle Glen on Saturday, August 13th, was attended by about 20 members and friends. Although the object of the excursion was Wattles, it was somewhat early to observe them in bloom, the Silver Wattles, *Acacia dealbata*, along the banks of the creek being in a semi-inflorulent state. Good specimens of the Hedge Acacia, *A. armata*, and the Spreading Acacia, *A. diffusa*, were noticed, in addition to a few plants of the Gold-dust Acacia, *A. acinacea*. Leaving the main road shortly after arrival at the station, the party was soon in the bushy hill country, and several varieties of orchids were collected in the moist gullies, including the Nodding Greenhood, *Pterostylis nutans*, Tall Greenhood, *P. longifolia*, and Blue Fairies, *Caladenia deformis*. After a pleasant ramble through the bush, we headed for Hurstbridge.—L. L. HODGSON.

EXCURSION TO FISH HATCHERIES.

About 30 members and friends attended the excursion to the Fish Hatcheries at Studley Park, under the leadership of Mr. F. Lewis, Chief Inspector of Fisheries and Game, on the afternoon of Saturday, September 10th. After giving a short explanation of the methods of hatching the eggs of Rainbow and Brown Trout, Mr. Lewis conducted the party through one of the hatcheries, where the eggs of these fishes were in process of being hatched. The ova were in various stages of development. The leader showed us through another hatchery, where the most modern apparatus for the propagation of fish has been installed, with the object of hatching native fishes, such as Murray Cod, Perch, and Blackfish. Success, it is confidently expected, will be ultimately achieved. The ponds in which many of the more mature fishes are kept were inspected. A vote of thanks was tendered to Mr. Lewis.—L. L. HODGSON.

The latest addition to the excellent series, Handbooks of the Flora and Fauna of South Australia, is "The Crustaceans," Part I., by Herbert M. Hale. The author is well known by his papers on crustaceans and aquatic insects, and has done much valuable research and systematic work. His book will be of great use to naturalists generally, and should stimulate interest in Crustaceans, of which Australia possesses many remarkable forms.

In order to become acquainted with the various parts of which a beetle is composed, a reference diagram is helpful. This is often available only by purchasing some costly book, and even then the beetle figured is probably a European species. The drawing by Mr. C. Deane (on next page), is given in the hope that it may be useful to readers who do not wish to go to much expense, yet need the information. The insect figured is, moreover, an Australian indigenous species. By tracing the diagram and forming carbon copies, describers of Carabidae will have a standard to check off the features of the species under review.

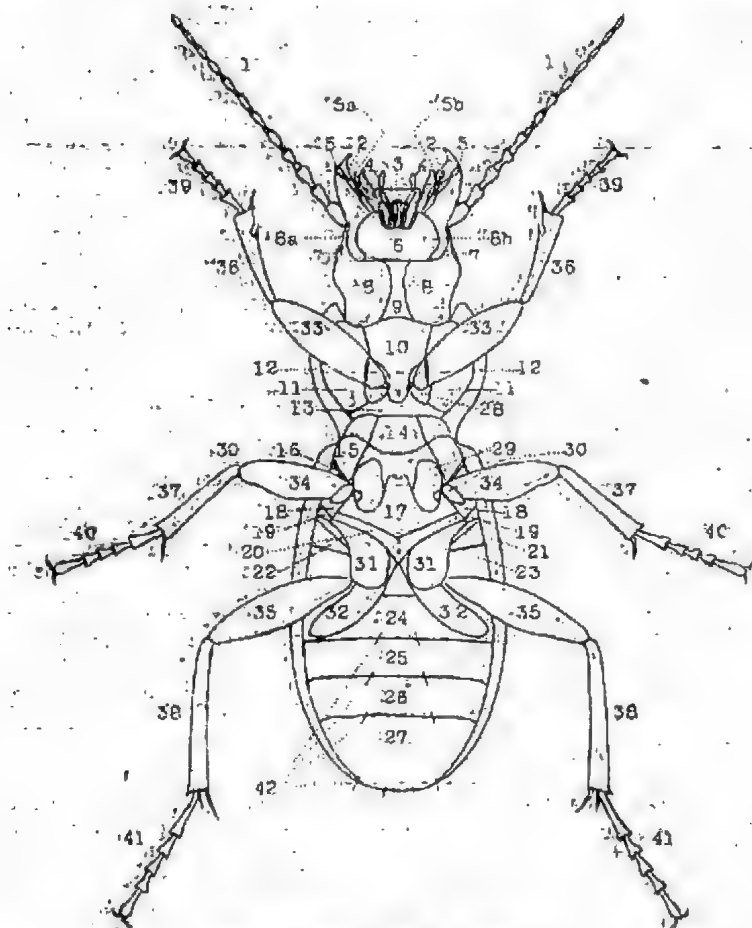


DIAGRAM OF A BEETLE.

Ceratoferonia phylarchus, Sloane; fam. Carabidae, showing some of the under parts. 1, antennae; 2, mandibles; 3, labrum; 4, labial palpi; 5, maxillary palpi; 5a, outer lobe (palpiform), and 5b, inner lobe of maxilla; 6, mentum; 7, eye; 8, head; 8a, gena; 8b, buccal fissure; 9, gula; 10, prosternum; 11, prosternal episternum; 12, inflexed side of pronotum; 13, prosternal epimeron; 14, mesosternum; 15, mesosternal episternum; 16, mesosternal epimeron; 17, metasternum; 18, metasternal episternum; 19, metasternal epimeron; 20, posterior division of metasternum or ante-coxal piece; 21, epipleuron or inflexed margin of elytron; 22, plate of ventral segment (basal); 23, 24, 25, 26, plates of ventral segments; 27, plate of ventral segment (apical); 28, anterior coxae; 29, middle coxae; 30, trochanter; 31, posterior coxae; 32, posterior trochanters; 33, anterior femora; 34, middle femora; 35, posterior femora; 36, 37, 38, tibiae; 39, 40, 41, tarsi; 42, ventral or ambulatory setae.

ABORIGINAL BURIAL CUSTOMS.

BY A. S. KENYON.

Very much has been written, and much conjectured, as to the esoteric meaning of burial customs. As far as our own primitive Australians are concerned, little more meaning can be extracted from them than from their other customs, their implements or utensils. Primitive man, always living in fear of nature and its violent manifestations, is continually under its influence. Hence his implements vary with the material available, and, similarly, his burial customs are much governed by natural conditions.

It is true that, within one nation's territory, inhumation in various ways, platform and tree-exposure, hollow-tree burial, cremation, and simple abandonment, were all practised: but along the Lower Murray, inhumation was the sole means employed. This was the case even with such unimportant persons as babies, children, uninitiated men, women, and old men who, for various causes, had ceased to command respect. For initiate men, it was a different story. Special interment sites, or cemeteries, were selected, always in sandy ground, the sandier the better. The whole site was more or less cleared, and at times elaborate systems of mound-markings, semi-circles, concentric or single, elliptic segments and straight lines, were constructed. The existing trees or shrubs, generally *Pittosporum phylliracoides*, *Heterodendron oleaefolium*, or various acacias, were preserved and helped to form a picturesque grouping with the mounds and burial huts.

In no case was the so-called foetal, or doubled-up, attitude in use. The corpse was stretched out full length, sometimes with the hands supporting the head, and lying sideways; sometimes on its back, with arms along the sides. The depth was 3 feet to 4 feet. On the bottom a freshly stripped sheet of bark was laid, with a mattress or covering of fresh grass, or leaves. A special pillow was contrived, resting on a pile of fresh ashes, or white sand. The whole was covered with a skin rug, on which the corpse was extended. More grass or leaves were spread over, and the sand filled in. On the surface a heavy layer, about 12 inches, of grass was placed, filling the whole space between the encircling banks. Sill logs were placed round, and spars brought up from them to a ridge about 4 feet above

the ground. On these rafters were laid parallel sticks, on which grass was packed tightly, making a good weather-proof roof, the whole being held down by a large fishing net, securely pegged down at the margins.

A good deal of ceremony accompanied the funeral, which sometimes meant the carrying of a heavy body a number of miles. A litter, or palanquin, of branches, held up by four men, was used. Behind followed the tribe, yelling and groaning in the most heart-rending fashion. Gashing of the bodies and cutting of the head was practised freely by the women, but not by the males. Watch was kept over the grave by the widow, or widows, assisted by her tribal, or totemic, sisters.

Below the Darling junction, in addition to the universal painting of the body with copi, or gypsum burnt into a very efficient plaster of paris, the widow covered her head so thickly with handfuls of the copi at a time, that the mass became too heavy to sustain after two or three days, and it was removed from the head, the hair having been previously protected by netting, and placed inside the sepulchral hut. As a month was usually occupied in mourning, these so-called widow's caps, weighing up to 40 lbs., amounted to 8 to 10 on the one grave. Their comparative rarity is accounted for by the fact that the early settlers, with their big fire-places and log and daub walls, used them freely to make whitewash.

Now all that remains, where the sand has drifted, are fragments of bones of all sizes, occasionally a complete skeleton outstretched, with unio shells, bones and egg shells and other kitchen midden remains of the funeral feasts. An interesting and very human race has disappeared, leaving no records save those that can be collected by the archaeologist, in their stone and bone remains.

"A Bird Book for the Pocket," by Edmund Sanders (Oxford University Press, London), is a small, delightful volume, illustrated with coloured plates. The author deals with all the regular British species, and the book should prove very popular among bird lovers in Britain. A book on the same lines, treating of Victorian birds, would be welcome; and one on our wild flowers would be a boon indeed.

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FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall, Victoria-street, Melbourne, on Monday, October 10th, 1927. Mr. P. R. H. St. John occupied the chair, and about 90 members and friends were present.

CORRESPONDENCE.

From Chief Inspector of Fisheries and Game (Mr. F. Lewis), inviting the Club to nominate two members to accompany him on a visit to Phillip Island on November 26th, for the purpose of inspecting the damage being caused by drifting sand to the Mutton-bird rookeries. It was decided that Messrs. E. E. Pescott, F.L.S., and C. Barrett, C.M.Z.S., be asked to accompany Mr. Lewis.

From Royal Commission on the Constitution of the Commonwealth, asking whether the Club desired to give evidence before the Commission during its sittings in Melbourne, on the question of the control of aborigines.

The Hon. Secretary announced that Mr. A. S. Kenyon was prepared to give evidence before the Commission on Commonwealth Constitution, and it was decided that he should represent the Club in this connection.

REPORTS.

Reports of excursions were given as follow:—Wattle Park, Mr. L. L. Hodgson; Hume Vale, Mr. A. J. Tadgell; Carrum, Mrs. V. Miller; and Frankston, Mr. L. L. Hodgson.

ELECTION OF MEMBERS.

The following were elected as ordinary members:—Mrs. F. Dowdle, 40 Toorak-road, Malvern; Miss M. Doyle, 50 Domain-road, South Yarra; Miss S. Serpell, Williamson's-road, Doncaster; Mr. Ivan Le Souef, 52 Grey-street, St. Kilda; Mr. Lance Le Souef, c/o Messrs. Victor Leggo & Co., Queen-street, Melbourne; Mr. and Mrs. W. T. O'Neill, 3 Royal Parade, Sandringham; and Mr. C. Thompson, Charnwood-road, St. Kilda; and as Country Members:—Mr. H. J. Oke, B.A., High School, Geelong; and Mr. Vernon R. Davey, Toolern Vale.

GENERAL.

The Chairman referred to the recent death of Mr. G. Coghill's mother, and expressed sympathy with Mr Coghill in his bereavement.

Mr. F. G. A. Barnard drew attention to a news para-

graph stating that the Water Reserve at Cheltenham was to be made use of in connection with a golf links. He moved that the Minister for Lands be written to and asked whether this had any bearing on the recent veto of a proposal to allow portion of Cheltenham Park to be used as a motor parking area for golf club members. Seconded by Mr. F. Pitcher, and carried.

Miss D. Nokes suggested that a letter be written to Mr. T. M. Burke, complimenting him on his action in presenting an area of land at Mt. Dandenong for a national reserve.

Mr. P. R. H. St. John said that he considered that the Club should give attention to the matter of choosing a national flower for the State of Victoria. Mr. G. Coghill moved, and Mr. F. G. A. Barnard seconded, that the matter be referred to the Committee, and that it be placed on the business paper for discussion at the next meeting. Carried.

The Hon. Secretary reported that a party of members, consisting of Messrs. E. E. Pescott, C. Barrett, H. B. Williamson, C. Daley, and V. Miller, had left on October 7th on a Natural History Expedition to the Western District, under the auspices of the Club.

PAPERS, ETC.

"The Story of a Meadow Moonwort," by Mr. F. G. A. Barnard. The author related the finding of a specimen of the rare fern, *Botrychium Australe*, R.Br., near Oakleigh, in September, 1887, and gave some interesting particulars of its subsequent growth as a pot-plant.

"On the Buffalo Plateau," by Mr. L. L. Hodgson. This paper dealt with the physiographical and botanical features of the Buffalo Plateau, as observed during a short vacation in December, 1926, reference also being made to the bird and other animal life of the district. A fine series of lantern slides, from photographs by the author and Mr. H. B. Williamson, was shown in illustration of the paper.

EXHIBITS.

By Mr. F. G. A. Barnard.—(1) Orchids from South Warrandyte (collected by Mr. A. E. Opperman), including *Caladenia testacea*, *C. suaveolens*, *C. carnea*, *C. Patersoni*, *Thelymitra aristata*, and *Diuris longifolia*. (2) Flowers from Greenbushes, W.A.

By Mr. G. Coghill.—Cultivated specimens of *Grevillea rosemarinifolia*, *Prostanthera nivea*, and *Kunzea parvifolia*.

By Mr. C. J. Gabriel.—“Cup and Saucer” Shell (*Mitralaria egoestris*, Linn.) from San Remo, showing calcareous plate, by means of which the animal is fixed to rocks.

By Dr. H. Flecker.—Specimens of Carnotite (*Potassium uranyl vanadate*), and Ilmenite (Titanate of Iron) from Radium Hill, via Olary, S.A.

A MARINE SPIDER.

A remarkable spider was collected at Black Rock (Vic.) recently, and I am indebted to Mr. J. B. Elliott, of St. Kilda, for details regarding its habitation. At about 200 yards from the shore, in water 15 in. deep at low tide, a rock, nine inches in length, was examined, and on the underside, two cylindrical holes, $\frac{3}{4}$ inch in diameter, and 2 inches in depth, were noticed. At the bottom of one of these a small spider lurked. To retain the spider, the hole was filled with sea water, and the spider was observed at the bottom of the cavity during two hours, when the rock was being brought to me. The spider was quite active when taken from its retreat.

The European Diving Spider, *Argyroneta aquatica*, spins an inverted domed web among water-weeds, and by bringing down air imprisoned between its hairy legs, it gradually fills its home with silvery bubbles. In a similar manner this marine spider could fill its habitation with air; and it is common knowledge that spiders have been observed to prey upon small crustaceans. To the best of my knowledge, this is the first record of a marine spider in Australia. It belongs to the family *Zodariidae*, and possibly is an undescribed *Storena*. Length, $\frac{1}{2}$ inch, cephalothorax, rich brown; abdomen, grey; chelicera, almost the length of the cephalothorax. —S. BUTLER.

EXCURSION TO CARRUM.

Five members of the Club attended the excursion to Carrum on September 24th. On the way, during a short burst of sunshine, we had a glimpse of snow on the Dandenong Ranges. The afternoon was showery—smart hailstorms alternating with brilliant sunshine. However, the collecting ground—close to the railway station—was thickly covered with Tea-tree, which afforded shelter. Five species of orchids were found flowering in profusion—*Pterostylis pedunculata*, *P. concinna*, *P. nana*, *P. nutans*, and *Caladenia latifolia*. In places the ground was carpeted with orchids; one patch in particular being 45 feet x 15 feet, and containing all the varieties found in flower. Unfortunately, this collecting ground will not be available much longer, as the land is being rapidly taken up for residential purposes.—V. H. MILLER.

FOSSIL HUNTING IN VICTORIA.

(A Lecture on this subject was given before the Field Naturalists' Club of Victoria, on August 8th, 1927.)

BY FREDK. CHAPMAN, A.L.S., F.G.S., &c., Palaeontologist to the National Museum.

Melbourne is an ideal centre for fossil collecting; while farther afield there are the happy hunting grounds of the Geelong district, the Gisborne and Romsey area, Bacchus Marsh, Cape Otway, and the Western District, to say nothing of the many richly fossiliferous fields through the whole of Gippsland.

One of the encouraging features of any Field Club is the readiness of its more experienced members to help the beginner. In this way, the first steps have been illuminated for many a worker. Among these men who did so much for the geological tyro in past days was Professor Rupert Jones, one of the early Secretaries of the Geological Society of London, who, curiously enough, was the first to recognise that here, in Victoria, we had undoubted Miocene beds largely developed; and it was from him that much of my own enthusiasm for the study of micropalaeontology was derived. And so we would pass on the torch of knowledge to others, who may take an interest in one of the most fascinating subjects in or under the earth.

Among the treasures that from time to time have been found in the Melbourne bed-rock, may be mentioned the curious spine-bearing *Ampyx*, a trilobite of small size, not unlike a broad woodlouse. This trilobite used to creep, crawl, and swim over the soft sticky mud of the Melbournian sea, 60 million years ago, at the spot that we now call Hoffman's brick-pit. In the same quarry, near the top, where it is more sandy, there was also found the remarkably perfect and delicate sea-lily, called *Helicocrinus*, with plummy arms that gathered in food. This is a specimen unique of its kind, and may now be seen in a place of honour in one of the table-cases at the National Museum. Towards the bottom of the same brick-pit, Mr. R. Evans, one of the workmen, recently found another wonderful specimen, a fossil jellyfish. This was perfectly preserved, and carefully handed over by its discoverer. When it was photographed, even the tentacles of the jellyfish could be seen extended from the rim of the umbrella.

Only one other discovery of this particular kind of jellyfish has been made—in Trenton County, New York

State. The original finder of the American specimen named it *Discophyllum*, or "disc-shaped coral," finding it difficult to conceive of such a soft-bodied object as a medusid being preserved through the ages. In that storehouse of interesting fossils, the Moonee Ponds Creek at Brunswick, there have occasionally been found the curious lamp-shells named *Lingula*, on account of their tongue-shaped outline; much of their interest lies in the fact that the shells are almost as fresh as when dredged up from the deep sea, the phosphatic and horny layers of their complexly built shells having remained intact, even from chemical alteration, since the day when they were sealed up in the mud of the old Melbournian sea.

The Melbourne bed-rock, in other places, contains some very interesting fossil remains, as in the South Yarra area, where excavations were carried out during the Yarra improvement scheme. The amount of material gathered there for future work was prodigious, and this collecting was largely due to the efforts of the late Mr. Frank Spry, who, besides specialising on entomology, found time to investigate the fossils of the district. The Museum collections have been greatly enriched by Mr. Spry's energy and acumen in this direction, and one of his most notable finds was the fossil *Trachyderma*, or *Keilorites*, as it is now called, since the former name was pre-occupied by a beetle. This leathery-tubed worm, like the living *Serpula*, with its limy tube, emerged at the surface of the mud of that ancient sea, and spread its feathery S-shaped arms to gather in its food. These arms were studded with eyes, which may be seen on the fossilised gill-plumes as minute carbonaceous dots, and exactly in the position where we may find them in the modern *Serpula*.

It took, by the way, seventeen years to work out the relationships of this particular worm, which at first was casually referred to something of a sea-weed nature. During the time when Spry was collecting, he was also superintending the sewerage excavations in Melbourne, and thus secured many valuable fossils in the heart of Melbourne itself, some of these proving the former existence of a shallow sea where Swanston-street now is, for he discovered in the mudstone a most remarkable shoal of little lamp-shells, actually at the Cathedral Corner.

The younger division of the Silurian strata round Melbourne is well represented in the Lilydale district. Cave Hill itself is a lime stone development of the

Yeringian beds, as they were named by Prof. J. W. Gregory. This limestone, full of the most exquisitely preserved corals and extinct univalves, is turned into the kilns to be made into lime. The beds of limestone in the Cave Hill quarry are tilted at a high angle, and the corals can often be distinguished in the position of their growth in relation to the bedding plane. The chances of discovering new kinds of fossils here seem to be unlimited.

The brown mudstone of the surrounding Lilydale district is evidently of about the same age as the limestone, for there are many species of shells common to both rocks, though there is some slight variation in the faunas, as one might expect, for the phase of deposition in that part of the Yeringian sea was a muddy one. At Rud-dock's quarry numerous trilobites have been found in this mudstone, such as *Goldius greenii*, related to a Bohemian fossil, and named after its discoverer, Dr. J. S. Green, a former member of this Club; the shovel-headed *Phucops*, with its great compound eyes; and the delicate little *Cyphaspis*. Many interesting lamp-shells are also found in the mudstone, and very often pieces of the rock occur crowded with their remains, as if drifted into pools.

In dealing with the fossiliferous deposits round Melbourne, we make a chronological jump from the Palaeozoic bed-rock to the comparatively modern Tertiary sediments at Beaumaris. That locality has always been a favourite collecting ground, and one industrious searcher, Mr. H. Mathias, to whom the National Museum is indebted for many choice specimens, made, in one day, the extraordinary score of 63 specimens of sharks' teeth. Usually the first fossil to fall into the collector's bag is the neat little heart urchin, *Lovenia forbesi*; this was even known to Alfred Deakin, who assured me, when I first arrived in Melbourne, that he had collected at least one of my pets. Among notable finds at this cliff there are,—the magnificent tooth of an extinct Sperm Whale, *Scaldicetus*, discovered by Mr. F. D. MacGee, also some related kinds of whale, like *Physeter*, named by McCoy, and a host of teeth of sharks, which have been mostly found in the shingle beneath. As a record for size, the right palatine or maxilla of an Elephant Fish, *Edaphodon*, should be mentioned here, since it was found in the Beaumaris shingle by one of our members, Mr. H. J. Prentice.

Another interesting exposure of fossiliferous beds near Melbourne, of Tertiary age, is that seen in the Flemington railway cutting, where an ironstone bed rests on the older basalt. This ironstone contains many casts and moulds of shells, including the well-known muttonfish, *Haliotis*, but of an extinct species. That, and other shells of the ironstone, indicate that they were living on a rocky shore line. Above these beds in the cutting are other, less fossiliferous ones, and more uniformly sandy in their nature; these are of the same age as those of the Beaumaris Cliffs, but not so full of fossils. A similar ironstone bed to that of Flemington has been known for many years to geologists, at Green Gully, Keilor. The fossils from this bed, and the underlying limestone have lately been investigated and described by Miss Irene Crespin, who found a similar fauna there, which contained the *Haliotis* and a turreted shell, *Cerithium flemingtonense*, formerly recorded from Flemington.

The limestone at Green Gully yielded several new species, principally of the microscopic foraminifera and the calcareous algae. In these ironstone beds the hollow moulds of the fossils afford the most perfect replicas of the ornament of the surface of the shells, if a squeeze in plasticine or soft wax is taken. This shows that the original material of the ironstone was once in a state of slime or ooze, such as we now find being formed by iron-secreting bacteria.

Farther afield are the interesting exposures of fossiliferous marls of Balcombian age, older than the Beaumaris and the Flemington Tertiaries, at Mornington and Grice's Creek, Port Phillip. If we take some fine washings from these Oligocene marls and after drying, mount the material in Canada balsam, we may note the abundance of exquisite shells of the little sea-butterflies, *Limacina*, as well as numerous foraminifera, belonging to the minute *Lagenae*, which remind one of the most beautiful creations in Venetian glass, only much smaller than ever seen. Here, also, we may pick up the curious nautilus-like shell, *Aturia*, with funnel-shaped siphuncular tubes, and sometimes colour bands. In the same area there is the Sorrento boring, the fossils from which amount to many thousands; and all of these will presently be described or listed in a publication by the Geological Survey of Victoria. This boring proved the almost entire succession of the Victorian Tertiary beds, for typical fossils found at certain horizons helped to

prove the various horizons, such as *Eutrochus fontinalis*, a Torquay fossil, at some distance down the bore. Other interesting evidence afforded by the bore was the presence of former river muds, alternating with marine deposits, at various levels down to over 400 feet.

The low fossiliferous cliffs at Corio Bay afford a good collecting ground, especially for corals and lamp shells; while the comparatively modern freshwater limestones of Limeburner's Point have yielded the remains of the great marsupial, *Diprotodon*. This particular rock, when seen under the microscope, shows that the lake in which it was formed, was also the home of a thick growth of water-weed; and, as in other Pleistocene freshwater limestones in Victoria, there occasionally drifted into the lake, clouds of pollen, probably from the Cypress trees of the uplands.

Near Geelong are also the attractive fossil beds of Torquay and Waurin Ponds, where many interesting extinct sea-urchins are found, including four species of the typically Miocene genus, *Linthia*. The "Fossil Ledge" at Bird Rock, Torquay, is composed of a bedded mass of the handsome bivalve, *Glycymeris*, while beneath this bed may be found the rare and wonderfully interesting cuttle-bone, *Spirulirostra*, half shell and half sepistaire. At Batesford, again, there are the great quarries in the Miocene limestone, where pectens and discoidal foraminifera are abundant. The latter, termed *Lepidocyclinae*, meaning "scaly-discs," indicate the age of the limestone as Burdigalian, for even the species is identical with that from French and Italian localities.

In boring for water many years ago, Jurassic fossils were obtained at Bellarine, near Geelong. Many of these actual specimens, such as *Cladophlebis*, *Sphenopteris* and *Coniopteris*, may be seen displayed in the table-cases at the National Museum. Similar fossil ferns have more recently been discovered in the Jurassic mudstones at Queen's Park, Geelong. The Jurassic beds in the Cape Otway district contain very well preserved fronds of ferns, as well as leaves of the extinct kind of Maiden-hair Tree, called *Baiera*. This lake sandstone is in evidence round Lorne, where Mr. Mulder made a large collection of Jurassic fossils; some of these are now in the National Museum, together with the described types from the same beds that were examined by Professor Seward.

Among the older rocks of the Bacchus Marsh area

there are the graptolite beds, which also contain the curious pod-shrimp, *Rhinopterocaris*. At Bald Hill we find the Permo-carboniferous sandstone with its large and handsome leaves of the early seed-bearing plant, *Gangamopteris*. This plant once ranged over the Gondwana continent, comprising India, Australia, South Africa and South America. Although the lowlands at this time supported a mild climate vegetation, the great glacial beds associated with them seem to be evidence of land sufficiently high to be above the snow-line. It is still a problem how, if it were an ice-cold sea, such as is postulated for the Permocarboniferous, it could have supported an abundant fauna of corals, immense rafts of sea-mats and giant molluscan shells, such as are typical of beds of similar age in New South Wales.

Around Gisborne and Romsey many curious and beautifully preserved graptolites and "sea-firs" have lately been discovered. Some fine net-like *Dictyonemae*, and the strange bristle-covered *Lasiograptus*, were recently secured by Mr. W. J. Harris from the Gisborne and Bulla districts, whilst students from the Geological Department of the University some years ago made a unique find at Monegeeta, of fossils closely allied to "sea-firs," which are still found living round our coasts. But in a short talk like the present, it is impossible to do justice to the treasures awaiting the collector in the richly fossiliferous areas round Muddy Creek, Hamilton, and, so, as when the lecture was given, about half of the material is left over until another time.

In conclusion, we may remark that, unlike many other natural history specimens, fossils in most cases require little or no preparation. With fossil leaves that are preserved on shales, and so in danger of peeling, it may be necessary to thinly coat the surface with size, taking the precaution to have the solution warm and quite liquid. Water-glass and varnish may be used in special cases, and where marcasite, the unstable iron disulphide is present, it may be necessary to immerse the specimen in a tube containing water.

In the case of friable Tertiary marls, such as we find at Muddy Creek, the smaller fossils, as the gasteropods, bivalves, polyzoa, Ostracoda and Foraminifera, may be obtained by sieving the material on the spot, the sorting of which will afford much interesting occupation for leisure evenings.

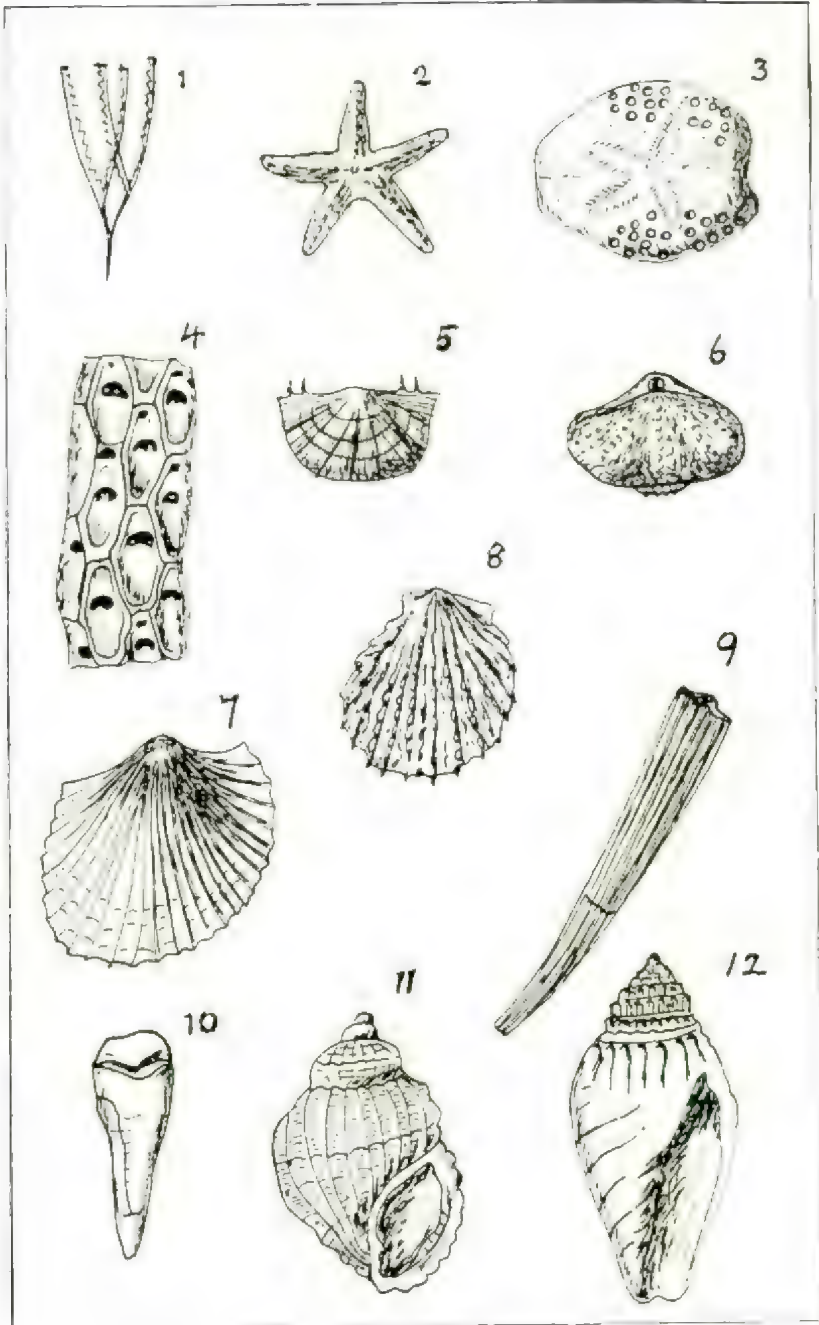
EXPLANATION OF PLATE (VII.).

- Fig. 1.—*Tetrugratus fruticosus* (J. Hall). Lower Ordovician. Lancefield.
 Fig. 2.—*Urasterella selwyni* (McCoy). Silurian. Kilmore.
 Fig. 3.—*Lovenia forbesi* (T. Woods). Janjukian. Beaumaris.
 Fig. 4.—*Ceclaria australis* (MacGillivray). Balcombian. Hamilton.
 Fig. 5.—*Chonotes melbournensis* (Chapm.). Silurian. South Yarra.
 Fig. 6.—*Tegulorhynchia squamosa* (Hutton). Janjukian. Batesford.
 Fig. 7.—*Panenka gippslandica* (McCoy). Silurian. Matlock.
 Fig. 8.—*Spondylus pseudoradula* (McCoy). Balcombian. Balcombe Bay.
 Fig. 9.—*Dentalium mantelli* (Zittel). Balcombian. Balcombe Bay.
 Fig. 10.—*Ilyolithes spryi* (Chapm.). Silurian. South Yarra.
 Fig. 11.—*Cancellaria calculata* (Tate). Balcombian. Balcombe Bay.
 Fig. 12.—*Volutilithes anticingulata* (McCoy). Janjukian. Torquay.

ORCHID NOTES.

Since living at Croydon I have been more in touch with orchids than for many years past. Friends knowing my interest in natural history have brought me many specimens to have the "why and wherefore" explained. In mid-October a wild-flower exhibition was held at the Wonga Park Hall, organised by Mr. I. Dyer, the headmaster of the local State School. In this locality, about five miles north of Croydon, consisting of wooded low silurian hills, interspersed with small alluvial valleys, orchids have been very plentiful during the early part of October, and at the display about 30 species were exhibited, besides a number of other interesting flowers. Among the latter were specimens of the handsome Flat-pea, *Platylobium formosum*, and *Goodia lotifolia*, var. *medicaginea*, from Marysville.

Of the orchids exhibited, the most notable were *Thelymitra aristata*, a fine spike with 25 blooms; *T. luteo-ciliata*, Fitz.; *Lyperanthus* (*Caladenia*) *sunveolens*, both light and dark varieties; *Caladenia Menziesii* (Hare orchid); *C. testacea*, fine specimens of both red and pale varieties; *Pterostylis barbata*, the Bearded Greenhood (very fine); *P. alpina*, *P. mutica*, and *P. pusilla* (Ruddy-hood). Some of these I obtained for home examination, with interesting results. The Musky orchid, *C. testacea*, was nearly as fresh 12 days after as when exhibited; while the beautiful scented Sun-orchid, *T. aristata*, again opened its topmost blooms when put out in the sun. A specimen of that specifically badly-named orchid, *Diuris punctata*, from Tarrawingee (north-east) opened an additional flower in water, likewise *Calochilus Robertsonii* and *Pterostylis pusilla* still exhibited the movement of the labellum when touched, though more slowly than when fresh. A pure white Spider Orchid, *Caladenia Patersonii*, was gathered here lately, also a specimen of the May-fly orchid, *Acunthus candatus*. I hope to see Wonga Park on the excursion list for the middle of October next year.—F. G. A. BARNARD, Croydon.



Some Victorian Fossils.

THE HISTORY OF FLORA AUSTRALIENSIS.

V.

BY CHAS. DALEY, B.A., F.L.S.

Again, on May 15th, is a comment on the trying time Mueller was then experiencing, "You will have seen our friend, Mr. George Macleay. He is much interested in your welfare, and I hope you may find his friendly counsel of use in guiding you as to the best means of getting rid of your present annoyance."

On July 11th:—"I am afraid that you will not agree with me in many of my generic and other descriptions, but in these matters there is no positive best, and everyone acts according to his own convictions." Speaking of the remaining orders, he says, "However, I hope that all will come into the seventh volume, which will close the work, if I live to work it out."

Concerning the movement in Victoria to separate the offices of Director of the Botanical Gardens and Government Botanist, he thus comments on September 21st, 1872:—

"I am very sorry to hear of the continuance of your troubles—the independent interference of a subordinate is as bad for the gardens entrusted to you, and as annoying to yourself as the insolent interference of an ignorant superior in the case of the Kew Gardens, which has provoked so much indignant remonstrance on the part of all who are connected with science, and who appreciate Dr. Hooker's value,—but notwithstanding all the indignation and remonstrance, the evil I fear goes on, and will go on."

Engaged in the *Genera Plantarum*, he has little time for the *Flora*. August 27th, 1873:—I have to thank you for the last sheet of *Fragmenta*. I am glad to see that you continue to get new and interesting plants to publish preparatory to the supplemental volume of the flora, which I feel certain will be left for you to work up. All I can hope to have life and health for is the work of the seventh volume. I was sorry to see you taking up the modern German notion of reviving obsolete names to replace those which are universally adopted. It is all very well to restore a name . . . for genera only known to a few botanists; but abolishing such well-established names as *Stylidium* and *Forstera* only creates confusion, and retards instead of advancing science. The change will certainly not be adopted, and only adds to the heavy synonyms with which the science is clogged, and which tends so much to depreciate systematic botany in the eyes of the philosophical botanist.

I think it would be very advisable if you could prepare for publication in your own name immediately after the completion of my seven volumes, an additional one containing all the addi-

tions and corrections—you have to make to the flora, and a general survey of the botany of Australia and its distribution over the territory, with relation to physical conditions and to presumed origin—all which can be much better worked out in the country itself than here, and is therefore much fitter to be undertaken by you than by me even if my time admitted of it—but I can only think now of trying to bring to a close what I have in hand without attempting anything new.

Owing to being engaged on the *Genera Plantarum*, Bentham was not able to start the seventh volume this year; then he made two visits abroad, and at the end of the year 1874 was working from six to eight hours at the *Genera Plantarum*. He writes, "I do not like working in partnerships,—the *Genera* with Hooker is the only partnership I have ever entered into, and would not do it with anyone except him." In 1875 little work was done on the Flora, but on May 4th, he writes:—

"I feel much distressed that you should not yet find yourself comfortable in your position, and should really have been very glad to have done anything to assist you; but I have no intercourse with official people; and, if I had, it would have been impossible at this distance, and without any means of investigating colonial affairs for me to interfere upon any plausible grounds. It is well known how fully we appreciate your scientific eminence, and to that we are always ready to bear our testimony whenever occasion seems to call for it."

This alludes again to the long-threatened division of duties in Victoria, by which a new Director of the Botanical Gardens was appointed, Mueller's duties being restricted to that of Government Botanist.

It was not until towards the end of 1875 that work was resumed on the *Flora Australiensis*. In June, Bentham sent a copy of the *Genera Plantarum* to Mueller, but was unable to continue steadily at the Flora during 1876, and writes on October 18th:—"I begin to feel very anxious about the completion of this last volume of the Flora, for I doubt whether my working powers will go on much longer."

This consciousness of failing health and energy is ever with him. On November 15th, 1876, he is awaiting plants by the "Agamemnon," and writes:—

I had once intended putting into the last volume some general remarks on the geographical distribution of the Australian flora, both in Australia and the countries with which it is connected, but I have been obliged to give up the idea. . . . Hooker gave so good a summary in his Introduction to the Tasmanian Flora that nothing would now be acceptable without working up in the same spirit all that has since been learnt on the subject by recent discoveries, and this would take up more time than I can now spare, besides that I have not the local knowledge necessary for rightly judging of the details, and all general principles must remain as laid down by Hooker.

It would, however, I think, be of much interest if you, with your experience, would give us a general view of the character and extent of the different floras more or less spread over Australia, the widely-spread desert flora of the interior, the Indo-Australian to the North-East, the Sub-Antarctic in Tasmania and Victoria, and the two distinct South-East and South-West endemic floras. This you could well do, and take the opportunity of completing the list of Australian plants with references to where you have published the species not contained in my flora, and re-arranging the whole systematically according to your view of genera and species when they differ from mine.

On June 27th, 1877, the new volume is partly in the printer's hands. The *Graminae* had been in much disorder, and General Munro had been of much help.

When I have published this volume of the flora I hope you will prepare a methodical supplement with all your additions. This will give you the opportunity of giving the character of the genera as you understand them where your views differ from mine.

I trust you will at the same time give a sketch of the physical features and characteristic flora of the different parts of Australia, which no one is in a position for doing so well as yourself.

With regard to the general geographical distribution of the Australian flora there is but very little to add or alter from what Hooker gave in his preface to the Tasmanian flora which makes me less regret that I have no time to work it out.

Then, on December 12th, 1877, in the last of these selected letters, he writes, in a spirit of relief after the anxiety in regard to being able to complete the work, which must have been a great strain on his energies towards the close:—

"To-day I send off to the printer the last pages of *Flora Australiensis*, except the index (which is ready); and to-day also they have packed up at Kew the last of your specimens to return to you. I shall long to hear of their safe arrival."

The last volume was printed in due course, bringing this great work and valuable collaboration of the two distinguished botanists to an end. No later letters seem to have been preserved, and after the *Flora Australiensis* was completed the intimate correspondence was not long continued, for Bentham, then 77 years of age, was in failing health, and his reserve increased in his closing years.

From the substance of Bentham's letters, it will be seen that his advice and suggestions had a good effect in stimulating Mueller to continue his valuable contributions to the Botany of Victoria in the *Fragmenta* and other works, and to direct his attention to useful labours as in the *Eucalyptographia*, the *Index of Australian Plants*, etc.

For fifty years *Flora Australiensis* has been the classical work on the plants of Australia; a comprehensive storehouse of botanical knowledge, carefully and systematically arranged, and of incalculable value to the student of Australian botany. It remains as a worthy and lasting memorial to its eminent author, to his faithful Australian collaborator, and to the effectiveness of their complementary labours conducted at so great a distance apart, and under most unusual circumstances.

EXPLANATORY NOTES.

Genera Plantarum.—A codification of the Latin diagnoses of all the genera of flowering plants, undertaken by William Bentham and Dr. Jos. D. Hooker in conjunction. In three large volumes the first published in 1865, and the last in 1883, the work is indispensable to technical botanists, and is still the greatest work of its kind.

Brief reference to the principal persons mentioned as directly or indirectly connected with the progress of Australian Botany.

Sir William Hooker (1783-1865).—An eminent systematic botanist and scientist. Professor of Botany at Glasgow; then in 1841 he laid a firm foundation for the Kew Gardens; Director until 1865; an outstanding figure in science for 60 years. P. 63.

Sir Joseph D. Hooker (1816-1911), the most distinguished botanist of the Victorian period; a great traveller and eminent scientist, the first to accept Charles Darwin's mutability of species; a prolific writer; chief works on Antarctic Flora, Flora of British India, *Genera Plantarum* (with Bentham) and *Index Kewensis*. Director of Kew Gardens from 1865 to 1885, a philosophical biologist, and the greatest exponent of the evolution of species. P. 63.

George Bentham (1800-1884), a distinguished botanist, unselfishly devoted himself from 1823 until his death to botanical study; for nearly twenty years working with the Hookers at Kew; wrote *Genera Plantarum*, and also *Flora Australiensis*, two monumental works on Botany. P. 63.

W. H. Harvey (1811-1866), Professor of Botany at Dublin; an able cryptogamic Botanist; in 1854 visited Australia, Tasmania, and New Zealand; collected in Victoria in Port Phillip and at Phillip Island; wrote *Phycologia Australica*, a great work. P. 65.

William Swainson (1789-1855) collected plants in Victoria and New South Wales; a naturalist. His Victorian Botanical Report is remarkable for its inaccuracy concerning timber trees; afterwards in New Zealand. P. 65.

James Drummond (1784-1865).—A fine Australian botanist; an indefatigable collector in Western Australia for 15 years; discoverer of many new species. P. 65.

Robert Brown (1773-1858), the greatest botanist of his day, accompanied Matthew Flinders in the "Investigator," between 1801-5. Collected 4,000 species of Australian and Tasmanian plants; laid foundation of the scientific study of Australian flora; wrote *Prodromus Florae Novae-Hollandiae*; for 30 years keeper of the Botanical part of the British Museum. *Facile Botanorum princeps*. P. 73.

Allan Cunningham (1791-1839).—Successful explorer and fine botanist, collected widely in Australia for Kew Herbarium; King's

botanist, and later Superintendent of Botanic Gardens, Sydney. (See *Vict. Nat.*, Vol. XLIII., No. 6.)

Dr. Bynoe, with Captain Stokes, collected plants 1837 at Victoria River, Bass Strait, and New South Wales. P. 69.

Sir Joseph Banks (1743-1820).—Munificent patron of science; with Captain Cook, 1768-71; made extensive botanical collections of Australian flora in New South Wales; President of Royal Society (1778-1820); employed botanical collectors and artists (Solander, Robert Brown, Dryander, Bauer, etc.) A truly great man. "The father of Australia." P. 97.

Nicholas Baudin.—French commander (1800-4) of "Geographie Naturaliste," Casuarina; visited North-west, West, and South coasts of Australia, also Port Jackson. Leschenault de Tour was botanist on his vessel. P. 97.

Louis de Freycinet, commanded "Uranie" and "Physicienne," French vessels, visiting western coast of Australia and Port Jackson. He also visited Blue Mountains and neighbourhood, collected Australian plants. M. Gaudichaud the botanist on his vessel. P. 97.

John S. C. D. D'Urville (1790-1842), distinguished French navigator and botanist; in 1824 the naturalist on "La Coquille" visiting New South Wales; afterwards visited Australia, New Zealand, Tasmania, in command of the "Astrolabe" and Zelve." Collected Australian plants. P. 97.

Dr. William Woolls (1814-1893), described and collected Australian plants, especially in New South Wales; had wide knowledge; a friend of Mueller. P. 155.

John Lindley (1799-1865).—Professor of Botany at London, the dominant personality in botanical science in the mid-Victorian era; a systematic botanist and horticulturist; edited the "Gardeners' Chronicle." In 1838 preserved the Royal Gardens at Kew definitely for the nation as the headquarters of botanical science. Described plants collected by Major T. Mitchell in Australia Felix, also many other Australian plants.

John McGillivray (—-1867).—Naturalist and collector on H.M.S. "Fly," on coastal survey of Tropical Australia, 1843. On H.M.S. "Rattlesnake," 1847, collected plants, etc., N.E. Australia, N. Australia and adjacent islands. Later, in H.M.S. "Herald," naturalist in Polynesian Islands. P. 129.

Charles Moore (1820-1905).—Director of Sydney Botanic Gardens, 1848-1896. Did much useful botanical work; published articles and sketches. P. 160.

Dr. Ludwig Preiss.—Collected largely in Western Australia during four years (1838-42); sold sets of plants in Europe; an early friend of Mueller, whom he advised to go to Australia.

Sir George MacLeay (1809-1891).—An explorer with Sturt (1829-30); for some years a member of the Legislative Assembly, New South Wales; returned to England, fostered horticulture; a liberal patron of science.

John Dallachy (1820-1871).—Appointed in 1849 Superintendent of Melbourne Botanical Gardens; a good collector; superseded by Dr. Mueller in 1857; collected in Victoria, New South Wales, Queensland. P. 164.

Rev. Julian Tenison Woods (1832-1899).—Published botanical papers on Tasmania and South Australia, and collected plants; referred to in the *Flora Australiensis*.

Errata: P. 64; line 25, Pt. I.—1854 (not 1954).

P. 187, line 26, Pt. III.—Acclimatisation.

ON THE BUFFALO PLATEAU.

BY L. L. HODGSON.

(Read before Field Naturalists' Club of Victoria,
October 10th, 1927.)

To many people the mention of Mt. Buffalo, or the Buffalo Plateau, brings visions of a snow-clad region, where ski-ing, tobogganning, and skating are the principal diversions. This conception is, to a large extent, an accurate one in so far as the winter months are concerned; but, at such times, the locality would necessarily have a limited appeal to the naturalist, with the absence of plants in flower, and also of most of the birds and other animals that seek refuge in the comparative shelter of the valleys from the rigorous climate of the higher altitudes.

Having this in mind when considering the Buffalo Plateau as a locality in which to spend a short vacation, I decided to arrange my visit at a time when the maximum interest could be derived from the flora, fauna, and other natural features of the district, and, accordingly, accompanied by my wife, I left Melbourne by train on December 15th last.

Being within two minutes' walk of the Gorge, our headquarters at "The Bungalow" were ideally situated for close examination of the locality with the minimum effort. Perhaps the most interesting and attractive physical feature of the vicinity is the famous Gorge, over the precipitous head of which the Crystal Brook dashes many hundreds of feet to its rocky fern-fringed bed in the shadowy depths beneath.

Just behind Bent's Lookout is situated the Government Chalet. An interesting record of the camp-out held by this Club in December, 1903, was found close at hand—a well-blazed Eucalypt with the names "C. S. Sutton," "— Gossler," and "G. Weindorfer," and the date "1903" deeply scored thereon, and quite clear, except that the encroaching bark is gradually closing over the edges of the old wound, and has already covered some of the end-letters. The vicinity of the Gorge is fairly well covered with several varieties of Eucalypts—principally the Snow Gum, *Eucalyptus coriaca*, var. *alpina*, Silver-top, *E. Sieberiana*, Candlebark, *E. Rubida*, and Willow Gum, *E. Mitchelliana*, many of which actually grow out of cracks and fissures on the rocky wall of the Gorge, apparently relying for their sustenance on the crumbling

rock, and the moisture caught and held in the crevices. It was a novel experience to see, in some instances, trees with trunks up to a foot or more in diameter growing, and, to all appearances flourishing, under such conditions.

Owing to the high altitude of the Plateau, ranging from 4,300 feet to 5,645 feet, the plants bloom much later in the season than in the lower country. At the time of our visit, a large number of species was in flower, and a considerable portion of our time was devoted to the collection of suitable specimens for herbarium purposes. Among the more interesting flowering plants found near the Gorge may be mentioned the very rare Blotchy Mint-bush, *Prostanthera Waltheri* (named after the late Mr. C. Walther), which was discovered here by Dr. C. S. Sutton and Messrs. G. Weindorfer and F. G. A. Barnard, in 1903, the only other localities from which it had previously been recorded being Mt. Ellery, in East Gippsland, and in New South Wales. Other interesting and attractive plants in bloom hereabouts were the pink-flowering Alpine Boronia, *Boronia algida*, Crimson Kunzea, *Kunzea parvifolia*, Mountain Shaggy-pea *Collistachys alpestris*, Rosemary Everlasting, *Helichrysum rosemarinifolium*, bearing masses of small pink-and-white blossoms, Gorse Bitter-pea, *Daviesia ulicina*, with its spiny foliage, Rosy Heath-myrtle, *Baeckia ramosissima*, a pretty little shrub with four-petaled pink flowers, and Leafy Bossea, *Bossiaea foliosa*, a striking yellow-flowered shrub with a great number of small round leaves.

The only orchid seen, either in bud or bloom, was the Spotted Sun-orchid, *Thelymitra ixiodes*, which, curiously enough, was found growing on a grassy patch under a large Eucalypt a few yards in front of "The Bungalow." Close search was made for other genera or species of the Orchidaceae in the course of several outings to different parts of the Plateau, but entirely without success. I was anxious to secure specimens of *Prasophyllum Suttoni*, discovered here by Dr. Sutton some years ago, but none were in evidence.

The bird-life about the Gorge was plentiful, although there was not a great number of species. With the first flush of dawn, the bush around commenced to resound with the mellifluous notes of the Gray Shrike Thrush, *Colluricincla harmonica*, mingled with the loud ringing call of the White-eared Honeyeater, *Meliphaga leucotis*, and the harsher cries of the Red Wattle-bird, *Antho-*

chaera carunculata. Sometimes the wonderful mimicry of the Lyre-bird, *Menura novae-hollandiae*, was distinguishable at some little distance, while a colony of Gray Currawongs or Bell-Magpies, *Strepera versicolor*, mingled their loud bell-like calls in the chorus of song, which was frequently punctuated by the sharp staccato notes of the Crimson Rosellas, *Platycerus elegans*, during their rapid flight among the trees. As the coming of day advanced, other species contributed their quota of melody, the familiar carolling of the White-backed Magpie, *Gymnorhina hypoleuca*, being especially welcome. The Kookaburra, *Dacelo gigas*, with his hearty laughter, furnished a contrast to the more tuneful notes of many of the other birds of the surrounding bush.

A flock of nine or ten Yellow-tailed Black Cockatoos, *Calpytorhynchus funereus*, was observed one afternoon wheeling and circling above the Gorge, the while uttering loud raucous cries. The bushes and small saplings constituting the undergrowth, were usually well tenanted by numbers of small birds, chiefly Large-billed and White-browed Scrub-wrens, *Sericornis magnirostris* and *S. frontalis*, and the Buff-tailed and Little Thornbills, *Acanthiza reguloides* and *A. nana*, together with many White-eared Honeyeaters, all busily engaged searching for insects. Both the Scarlet-breasted Robin, *Petroica multicolor*, and the Flame-breast, *P. phoenicea*, were frequently noticed, their brightly tinted breasts adding a pleasing touch of colour to their surroundings.

Crystal Brook, a small stream of clear sparkling water, running through a marshy "plain" or "tundra," hemmed in on each side by timbered hills, whose slopes are studded with irregular piles of rocks, is well stocked with Rainbow Trout. The stream pursues a somewhat tortuous course through the "plain," and the vegetation, although mostly of a stunted character, is of considerable variety and interest. Two of our Epacrids, *Richea Gunni*, with its tall spikes of creamy flowers and stiff spiked foliage, and the Coral Heath, *Epacris microphylla*, occur here, in association with the Waxberry, *Gaultheria hispida*, Mountain Aciphylla, *Aciphylla simplicifolia*, Common Buttercup, *Ranunculus lappaceus*, the Clustered and Satin Everlastings, *Helichrysum semi-papposum*, and *H. leucopsidium*, and Coarse Daisy, *Brachycome scapiformis*; while bordering the water's edge are flourishing bushes of the Tall Rice-flower, *Pimelia ligustrina*, var. *hypericifolia*, Long-leaf Hovea, *Hovea longifolia*, and Mountain Speedwell, *Veronica nivea*. All were in

bloom with the exception of *Hovea longifolia*, found in fruit only.

Overlooking the plain, the "Monolith," a huge tapering shaft of granite, rises to a height of 30 feet above the crown of a rocky mass, on the sloping edge of which it is precariously balanced. The "plain" itself, although somewhat dried out at the time of our visit, is of a boggy and peaty character, and the conditions are apparently unsuitable for Eucalypts and other large vegetation, only the low-growing shrubs and moisture-loving plants finding sustenance in the usually more or less water-logged soil. As the stream winds further up the small valley, the plain gradually closes in, until it becomes a narrow strip a few yards in width, to walk over which is like treading on very springy turf, so yielding is the damp peaty soil, with its thick covering of short grass, rushes and other dwarfed growth. Some three and a half miles up from the Gorge, a concrete wall has been constructed across the narrowest section of the miniature valley, thus forming the Crystal Weir, from which the "Chalet" draws its supply of fresh water. Just above the wall, the little valley widens out again, and the impounded water, dammed back up several small gullies, forms a most picturesque lakelet about 100 yards wide, at the centre and some quarter of a mile in length, almost surrounded by huge masses of rocks, including the Woolpack, and the Devil's Couch.

The flora hereabouts is somewhat sparse, and less varied than that met with lower down the valley, but some good specimens of Common Billy-buttons, *Craspedia Richea*, and the Purple and Ivy-leaf Violets, *Viola betonicifolia* and *V. hederacea*, were collected. On a Eucalypt under which we rested to have our lunch, we were joined by a Gang-Gang Cockatoo, which perched directly above us, and proceeded to regale itself on the gum pods, as evidenced by the shower of half-eaten pods and bitten-off twigs which fell on and around us. From the Crystal Weir, a rough foot-track proceeds past Og, Gog and Magog, three immense tors, the largest approximately 100 feet in height, among which was found the Common Shield-fern, *Polystichum aculeatum*, one of the few ferns seen. After skirting Jessie's Lookout, crossing a small grassy plain, and passing through a section of rather sparsely timbered country, the track terminates at Eagle Point, situated on the western edge of the Plateau, and overlooking the densely-timbered Buffalo River Valley. Some very brightly-coloured specimens

of the Pink-eye, *Tetratheca ciliata*, were gathered in this area, but otherwise the flora was poorly represented.

Returning to the Crystal Weir, another foot-track leads round the back of the Devil's Couch to Mt. Dunn, one of the more prominent peaks of the locality. A steep zig-zag track leads to the pointed summit, and, looking to the North-West, one has a fine view of the Crystal Weir below, backed up by Anderson's Peak and the neighbouring heights of the North Buffalo Plateau. The character of the country may be well gauged from the outlook provided over the greater part of the Plateau; The Cathedral, The Hump, and The Horn standing out clearly to the South. Retracing our steps to the foot of Mt. Dunn, we follow the track, and, after skirting several well-timbered slopes and gullies, shortly emerge at the head of the Long Plain, where rises the little stream which feeds Lake Catani. This plain is some three miles in length, with an average width of about a hundred yards, and has much the same characteristics already described as pertaining to the Crystal Brook plain. The track follows the creeklet to the headwaters of Lake Catani, along the left bank of which it continues until the road leading to the "Chalet" and Gorge is joined.

One morning we walked to The Horn, at the farther end of the Plateau. Within a short distance of the "Chalet," we crossed a small gully, in the moist bottom of which patches of Christmas-bush, *Prostanthera lasianthos*, and the Round-leaf Mint-bush, *P. rotundifolia*, were flourishing. The Alpine Mint-bush, *P. nivea*, was also growing somewhat less profusely, while several clumps of the Tasman Flax-lily, *Dianella Tasmanica*, displaying clusters of beautiful deep blue, yellow-centred flowers, were noted on the roadside. The winding road passes over the new timber bridge, recently constructed across the deep gulch which carries off the overflow from Lake Catani. This fine sheet of water, which teems with Rainbow Trout and Brown Trout, has been created by the erection of a curved concrete wall across a narrow section of the gulch just mentioned. The road runs round the east bank of the lake, which is about three-quarters of a mile in length, and of varying depths up to 30 feet; its width ranging from about 50 feet, at the weir, to three-eighths of a mile, at its broadest point near the intake.

The slopes on each side are well covered with several species of Eucalypts and various shrubs, while the mar-

gins are fringed with tall grasses and rushes, among which snakes are fairly numerous, being attracted by the presence of large numbers of frogs. Two black snakes, *Pseudechis porphyriacus*, were killed near the water's edge early in the morning of our trip. In the gulch below the weir, two specimens of one of our few conifers—the Mountain Plum-pine, *Podocarpus alpinus*—were observed growing almost in the water. The bushes, when shaken, throw off great quantities of fine pollen grains like clouds of yellow dust. Several bushes of Mountain Pepper, *Drimys aromatica*, were noted nearby. A few Black Ducks, *Anas superciliosa*, were seen swimming on the lake. A flock of Crimson Rosellas, *Platycercus elegans*, was noticed feeding on grass seeds, the bright blue and red plumage of the parent birds being rendered conspicuous by the more sombre green of their young.

From the head of the lake, the road penetrates towards the centre of the Plateau, here winding along the slopes of a well-timbered rise, there passing round the head of a small stream, or dipping to cross some slight depression in the contour, the prevailing vegetation on each side consisting principally of Eucalypts, with alternating patches of sparse undergrowth and bushy thickets. In the less thickly-clothed portions, thousands of Coarse Daisies, *Brachycome scapiformis*, displaying their bright mauve petals and yellow centres, studded the landscape, together with numerous spikes of the Trigger-plant, *Stylidium graminifolium*, mostly in bud, but many just bursting into bloom. We were delighted to find several bushes of the Royal Grevillea, *Grevillea Victoriae*, in flower a little further on; this is generally regarded as the finest of our Grevilleas, and its bright red flowers are certainly very beautiful.

The rock features of the surrounding country are of considerable interest. They are of granitic formation, and the gradual erosion of the softer portions has left many huge bosses and isolated tors. The "Torpedo" is a large boulder, balanced on another rock protruding slightly above ground level. Near at hand is the "Leviathan." This immense block rests on a comparatively small base, and a large number of persons could find ample camping accommodation under its massive overhanging sides. I believe that Sir John Monash estimates it to contain, approximately, 50,000 tons of solid granite.

Passing on, and skirting the rugged Le Soeuf Peak,

with the "Sentinel" and "Corral" close by, the foot of The Cathedral and The Hump is soon reached. The two peaks are practically portions of the one ridge, the occurrence of a low saddle between them being considered sufficient to differentiate them. The Cathedral rises up to an unscaleable mass of rock forming a bluntly-pointed summit, and is almost destitute of vegetation, a few sparse shrubs and Snow Gums, *Eucalyptus coriacea*, var. *alpina*, finding an uncongenial root-hold on its lower slopes. The Hump is a much larger and considerably higher mass, and is capped by two rounded knobs resembling the humps on a camel's back. Being the second highest elevation on the Plateau, it affords an excellent coign of vantage from which to view the surrounding country.

The road, which reaches its highest level near The Hump, now gradually descends as it approaches The Horn, while the intervening country becomes more rugged, being intersected by deep gullies, which eventually open out on to a slightly undulating plain-like area, surrounded by a tumultuous jumble of stream rocks, and dissected by several tiny streams which pursue extraordinarily tortuous courses, suggestive of the Grecian Key pattern. Skull Rock, a boulder very suggestive of a human skull, with the eye-sockets and other features quite distinct, rests on the slope of a rocky hillock. The lower portions of this area, bordering the streams, are boggy, and support only a scanty dwarfed vegetation, such as the Sky-Lily, *Herpolirion Novae-Zelandiae*, and Mountain Aciphylla, *A. simplicifolia*. The sparse plant life hereabouts is in striking contrast to that of the Eastern side of the Plateau, the rock-studded soil being apparently incapable of meeting the more exacting requirements and sustaining the more vigorous growth of the larger vegetation. The lower slopes of the adjacent heights, however, being above the influence of the marshy conditions prevailing in the low-lying areas, support a moderate growth of Snow Gums.

The Horn, which towers to a height of 5,685 feet, and is the highest peak of the Buffaloes, comes into view as the road emerges on to the margin of the plain-like area just described, and its sharply sloping sides give an impression of a very stiff climb to the summit. A graded zig-zag track, however, leads up the Western slope, and in about 20 minutes steady climbing, the topmost point is reached. Almost the whole of the mountain-side is covered with a dense tangle of Snow Gums, through

which a fire has evidently passed in recent years, practically every tree having been killed; the silvery white of the trunks and limbs giving the Mount a ghostly appearance in the near distance. A noteworthy feature of these trees is the manner in which they have been bent and twisted during their growing period, the majority with their topmost branches arched over until they touch the ground. This has no doubt been caused by the weight of snow, and the force of the prevailing South-Westerly winds. Fresh growth is, however, springing from the bases of the dead trunks, and, provided no further fires occur, and the area is allowed to regenerate itself without interference, a few years should suffice to restore it to its natural condition.

We walked back to Porepunkah on the last day of our stay. A rough track leads over the surface of an extensive outcrop of granite, and down the spur to Mackey's Lookout (3,600 feet). On the slopes were collected specimens of Shrubby *Trachymene*, *Trachymene billardieri*, Lanky *Goodenia*, *Goodenia elongata*, Burgan *Kunzea*, *Kunzea peduncularis*, Leafy *Bossea*, *Bossiaea foliosa*, Sweet Forget-me-not, *Myosotis suavis*, Creamy *Stackhousia*, *Stackhousia linearifolia*, and the small White-flowering Alpine *Grevillea*, *Grevillea Australis*, with its pungent, pointed leaves. Near Mackey's were noticed numbers of smooth-barked *Eucalypts*, with handsomely tinted trunks and limbs in tones of red, pink and green.

From Mackey's another short cut saves traversing a long loop in the road. A sweet scent noticed hereabouts was traced to some flourishing bushes of the Tree *Lomatia*, *Lomatia Fraseri*, bearing clustered racemes of pale cream flowers. A slender plant with large basal leaves, and a tall spike bearing yellow flowers in the leaf axils, proved to be the Spurious Mullein, *Verbascum blattaria*, an introduced weed. Derwent Speedwell, *Veronica Derwentia*, and Mountain Speedwell, *V. nivea*, were plentiful, while numerous Trigger-plants, *Stylidium graminifolium*, were in evidence, their tall stems being in a more advanced stage of inflorescence than those seen at higher elevations. Several species of Everlastings, *Helichrysums*, added a bright yellow note. The scented Groundsel, *Senecio odoratus*, Ivy *Goodenia*, *Goodenia hederacea*, and many Milkmaids, *Burchardia umbellata*, were also noted.

On reaching the Eurobin Bridge, a divergence was made to view the Ladies' Bath and Eurobin Falls. A

distinct change in the composition of the soil takes place near the Falls, the granitic character giving place to the Silurian formation, with a corresponding alteration in the type of vegetation, which is of a much less interesting nature. A further six miles, skirting the foothills, brought us to Porepunkah.

Wild animal life is somewhat scarce on the Plateau, though Wombats are occasionally seen in the dusk of the evening. Dingoes also frequent the timbered country, and their howls may often be heard at night. Only one of each of these animals was observed during our stay. On the journey up the mountain an Echidna was disturbed, and made vigorous efforts to burrow into the high bank of the road. After two or three minutes' strenuous effort, it desisted and raised its head to observe its disturbers, but, on the motor horn being blown suddenly, it was amusing to see the frantic manner in which it resumed its futile attempts to dig itself into the unyielding soil. There is a colony of Lyre-birds near the top of the Gorge, several being noticed, at times, scratching and feeding within a few yards of the "Chalet," in the quiet of the early evening.

In closing, I desire to acknowledge my indebtedness to Mr. A. J. Tadgell for kindly identifying a number of specimens of plants with which I was unfamiliar.

EXCURSION TO HUME VALE.

On Show Day holiday, September 22nd, a party of 18 visited Hume Vale, about four miles beyond Whittlesea. Many birds were heard and recognised. The Wedge-tailed Eagle, *Uroaetus audax*, soared majestically overhead, and a flock of a dozen Gang Gangs, *Callocephalon fimbriatum*, noisily feasted close by among the Eucalypts, their "nut-cracking" noise being distinctly heard, while the birds merely showed their thought of our presence by raising their bright red crests. Tree-creepers, Robins, and Thrushes were observed, also a nesting Thornbill.

Collecting bottles were in evidence, and many species of Coleoptera and Lepidoptera noted. Even the geologist's hammer gave convincing evidence of his presence. The botanists had a good field day, noting 101 species of native plants and 14 migrants. Among the 10 orchids seen, *Pterostylis alpina* was of interest to many. Orchids divided the honours with eight ferns, of which *Woodwardia caudata* was rarest to some. *Ophioglossum coriaceum*, with its peculiar fruiting spike, was abundant on the cleared slopes of Scrubby Creek, and was a novelty to a number of the party.

The finding of *Ranunculus parviflorus*, and its beautiful sister, the "common" Buttercup, gave rise to an interesting discussion on the family being the original progenitors of the many forms found in the floral world, also as to the construction of the pigment below the epidermis, giving cause for the unique mirror-like upper-surface of the petals, found in many *Ranunculi*.—A. J. TADGELL.

THE STORY OF A MEADOW MOONWORT.

BY F. G. A. BARNARD.

(Read before the Field Naturalists' Club of Victoria,
October 10th, 1927.)

It is seldom that a comparatively insignificant plant can claim so long and so interesting a history as that I can testify to regarding one of my pot-ferns.

In the early days of the Field Naturalists' Club of Victoria, now more than forty years ago, Oakleigh was often chosen as the locality for a Club excursion, and yielded many interesting specimens. Alas, habitations have claimed the former haunts of many rare birds, insects, and plants. The value of recording our findings in the *Naturalist* is emphasised by the following extract, from a brief report of a Club excursion held at Oakleigh on September 3rd, 1887, as published in the *Naturalist*, Vol. IV., p. 82:—"In another paddock several specimens of the rather rare fern, *Botrychium ternatum* were noted." (This fern is now listed under its earlier specific name, *B. australe*, R.Br.).

One of these plants I removed, and it has been exhibited, in a growing state, at many meetings of this Club. I planted it in a five-inch pot, and it has been under a lath fernery ever since. It has, on two or three occasions, been re-potted; but more frequently the surface soil only, to a slight depth, has been renewed. In fact, I may say that on account of its rarity, I have been almost afraid to meddle with it in any way.

This genus of ferns, familiarly known as "Moonworts," is almost unknown to the average fern-collector; for, though widely distributed throughout the world, specimens are nowhere abundant. According to Hooker's *Index*, only about forty species are known to science.

A few Victorian records exist for this species. The earliest I know of is that by S. Hannaford, in his "Jottings in Australia," published in 1856, where he says, on page 100:—"Botrychium australe, R.Br., Habitat. In swampy ground near Richmond. The only specimen of this plant found in Victoria, we discovered in August, 1853, and although we explored the neighbourhood with much diligence, could never obtain a second." Mr. C. French, senr., in his articles on "Victorian Ferns," in the *Southern Science Record*, 1881 (Vol. I., p. 3) records it from between Arthur's Seat and Cape Schanck. Another early record is that by the late Mr. D. Kershaw,

also from Oakleigh. That it must be rare in Victoria is shown by the following remark by Mr. F. Pitcher, in his paper, "In the Strathbogie Ranges" (*Naturalist*, Vol. XLI., p. 140)—"Though an old fern-collector, I found here my first specimen of the Meadow Moonwort, *Botrychium australe*, R.Br., a widely distributed fern, but nowhere plentiful. Being strange to me, I at first took it for an introduced plant." More recently Dr. Heber Green collected the species near Mooroolbark; while I have been told that it is occasionally met with in the Snowy River district, near Orbost.

For Victoria, a second species, *B. lunaria*, L., has been recorded, but it is extremely rare. This is a cosmopolitan species, and is more frequent in the northern hemisphere. Dr. Mueller (afterwards Baron F. von Mueller) collected it at Cobungra, Victorian Alps, in 1853; and Mr. C. French, senr., in his articles on Victorian Ferns, previously mentioned, states that he found it in Studley Park in about 1860. No other record seems to exist.

The name "Moonwort" is an old world appellation, tradition having ascribed to them medicinal properties if gathered by moonlight at the time of full-moon. They are then thought to be of value in the treatment of cases of lunacy. The generic name, *Botrychium*, is derived from a Greek word, signifying a bunch of grapes, from the resemblance of the clusters of spore-cases on the fertile fronds to miniature bunches of grapes. The spore-cases are spherical, about the size of dust-shot, which, when ripe, split and distribute immense quantities of spores, in the form of impalpable dust, but I have never noticed anything resembling a seedling of this species in my fernery. The older specific name *ternatum* referred to the three main divisions into which the pinnatifid sterile frond appears to be divided; while the later name, *australe* simply means southern.

The Moonwort belongs to the lowest group of ferns, close to the little Adder's tongue, *Ophioglossum*. In appearance the barren frond is like a small frond of bracken, but softer and more flaccid, and of a paler colour. It grows to a height of six to nine inches, generally out in the open. Its roots are not fibrous like the majority of ferns, but short and fleshy, about an eighth of an inch in thickness. To me its habits of growth have been of the greatest interest during the forty years it has been in my possession, and very probably it is the only plant of its kind which has been under observation for so long a period.

Like nearly all the other species of its genus; the Meadow Moonwort produces only two fronds each year, or perhaps they should be regarded as a branched frond, as they originate just at the surface of the ground from one vegetative bud. One bud develops annually, and the new fronds appear, in my specimen, as regular as clockwork in the second week in February in each year! and last till about December, when they turn yellow, wither off, and die. Its resting period in my fernery is thus very short, probably on account of the shade and moisture it receives there. In the open its growing period would probably be shorter, and its resting period longer, and this is likely to be the reason why it is apparently so rare.

From my experience, woodlice, slugs, and the introduced snails are particularly fond of the Moonwort's juicy stems, and I have had the greatest difficulty in preserving it from their raids, being obliged to place the pot on an inverted flower-pot standing in a saucer of water; and even then the pests sometimes beat me. I last exhibited my Moonwort at the Club meeting in June, 1926, when it had two perfect fronds; but soon after it had been returned to its accustomed spot, I found the stem had been nearly eaten through by a snail. I tried to bandage up the wound, but the fronds soon withered and died. I wondered whether my pet would survive this attack, and therefore was greatly pleased to see, on February 8th last, signs of the new season's fronds. Only the barren frond has been produced this year, rather more lax and straggling than usual, perhaps owing to the fact that this season it is in a different shade-house, having a different aspect.

Reference to the *Naturalist* shows that I first exhibited it at a Club meeting in May, 1892, rather more than four years after I obtained it at Oakleigh. What an interesting story it would have been had I kept a record of its behaviour, under all its trials during these forty years, for I remember on one occasion, when it lost a frond soon after it appeared, another was produced about three months afterwards, while on another occasion three fronds were produced at the same time.

Those who are not familiar with the plant, will find it illustrated, and briefly described in Part 3 of Mr. H. B. Williamson's "Ferns of Victoria" (*Naturalist*, Vol. XLII., p. 265-7.) In the species, *lunaria*, the pinules of the barren frond are half-moon, or saddle-shaped, and in times past witches were supposed to have used them as saddles for their broom-sticks when riding to the moon. How easily popular names were suggested in olden days!

HATCHING PROCESS OF CICADA.

BY JANET W. RAFF, M.Sc., F.E.S.

The Cicada nymph, or cast nymphal skin, so commonly found on tree-trunks, fences, etc., and the adult Cicada, are, of course, familiar sights to all, especially after such an invasion of the insects as occurred last summer. It is doubtful, however, whether the eggs, or newly-hatched larvae, have been noted by more than a few persons.

My observations have been made in the Zoological Laboratory, University of Melbourne, from examination of Cicada egg-nests, in twigs of a Eucalypt, handed to me by Professor Wadham, to whom I am indebted both for the specimens and for his kindness in taking the accompanying photograph. (Fig. 1.) Mr. J. H. Lang, of Harcourt, Victoria, from whose orchard the specimens were collected, informs me that it was the black Cicada that was prevalent there this year, especially during February and March, so, in all probability, the species concerned would be *Psaltoda moerens*. Mr. Lang noted also, that only dead wood was attacked by the insects.

Several records of the disfigurement of living trees, both native and orchard, due to Cicadas ovipositing in them, have been made, from time to time; and it is generally considered that this is the chief damage done, the injury due to the sucking habits of the insect during the whole of its life-cycle being of a minor nature.

As is well known, the eggs of the Cicada are laid in the wood of trees, the female piercing the bark with the strong, sharp ovipositor, and placing the



Fig. 1

eggs in the deeper tissues. Figure 1 shows two dead Eucalypt twigs, each about 12 inches in length, and as thick as one's thumb, very heavily scarred by Cicadas ovipositing.

Though I have not observed the actual egg-laying process, it is evident, from the very regular arrangement of scars on the twigs examined, that the Cicada thrusts its ovipositor backwards into the branch, while it is in position as if advancing *up* the tree; for, in all cases, the puncture formed by the insertion of the ovipositor is higher up the twig than the chamber made by its continued insertion.

As there does not appear to be a detailed account of the actual arrangement and number of eggs laid in the chambers by our local forms, nor a description of the hatching process, these observations are placed on record.

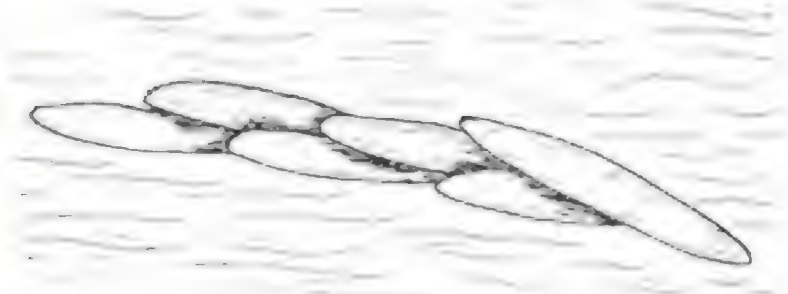


Fig. 2.

By lifting the ragged pieces of bark, and raising them gently, the eggs are seen to be closely packed, in a very regular manner, in a small groove, or egg-chamber; they lie two abreast, slightly overlapping one another, as shown in Fig. 2. On an average, there are eight eggs in a chamber, each one being elongate and spindle shaped, yellowish in colour, and measuring from 2 mm. to $2\frac{1}{2}$ mm. in length. The number of eggs deposited in each chamber may possibly be found to vary, according to the species of Cicada, locality, weather conditions, toughness of wood, etc. Egg nests in Walnut, collected at Bright, yield, on examination, an average of 12 eggs per chamber. In those chambers where the eggs had already hatched, the shells only remained, still arranged in the overlapping manner, and each showing a wide split at the anterior end.

Examining the eggs under a lens, it is seen that the anterior end lies at the upper portion of the chamber, i.e., towards the entrance, this no doubt making exit easier during hatching. The egg-shell being thin and transparent, the enclosed embryo, or larva, with black eyes, sucking beak, and legs closely folded against the body can be clearly seen. (Fig. 3.)

Hatching was observed to be taking place when first I received the specimens, in the middle of July. Considering the Cicadas in the Harcourt district were about in greatest numbers during February and March, one might assume that the eggs were laid not later than April. By this it would appear that hatching could take place possibly as long as 10 weeks to three months after deposition. As a matter of fact, this period can be lengthened even more; for, by placing the twigs in damp soil, and exposing them to the warmth of the sun, as late as September 15th, further hatching occurred, thus bringing the period up to four and a half months. This is of importance, since it is generally stated that the eggs remain for only six to eight weeks after deposition before hatching. Apparently, no doubt, depending on climatic conditions, this period can, therefore, be very much extended.

At the entrance of some of the egg-chambers were seen the young larvae, working themselves gradually out from their nests, head foremost, and freeing themselves of a thin skin. The empty egg-shells, each with a long split at the front end, were left behind in the egg-nest, arranged in the double overlapping manner described above. The manner in which the young larva freed itself of the thin covering during hatching was watched closely, and was as follows:—The head is first pushed through the "skin," then by a very slow sliding kind of movement, with no distinct struggles or contractions, the whole body is gradually released. The emerged head is reared well up, and the antennae become extended and begin to feel about; the legs gradually become free from their close apposition to the body and move about; but, strangely, are not used during hatching as a leverage to assist the remainder of the body from the covering. In a rather striking manner, the larva, all through the hatching process, seems to be able to support itself in the air, until only the tip of the abdomen remains in the "skin," and the final slight movement releases this. The crumpled thin whitish "skin" thus

cast in the final act of hatching, either remained adhering to the body, and was trailed round during the first movements of the active larva, or, as was generally the case, it remained sticking to the bark at the entrance to the egg-nest. On close examination, this "skin" appears to be a true "moult," or cast larval cuticle, and not an embryonic membrane, such as the amnion. This is of great interest, and I hope later to describe it in detail.

The larva begins at once to walk about, and very soon falls from the twig. It is whitish in colour, and measures about 2 mm. in length. The chief structural characters of the newly-hatched larva are the more or less rectangular head with long sucking beak, the minute eyes, the comparatively long antennae, and the extraordinarily strong, spined fore-legs. These features are shown in Fig. 4. The femur of the fore-leg is short and broad, and bears on its lower aspect a very strong heavily chitinized spine directed towards a similar but smaller one on the tip of the tibia. The femur and tibia, working on one another, thus form an efficient digging tool. The tarsus, composed of a single joint, is

articulated to the tibia some distance from its tip, and carries a pair of claws. (Fig. 5.) The second and third pairs of legs are of the normal type, there being no special enlargements of the parts.

The larvae were removed to small dishes of loose damp earth, some being supplied with fine rootlets for food, but I was unable to keep them alive for a longer period than five weeks. One could imagine the newly-hatched larva, provided, as it is, with such strong, digging front legs, beginning to burrow into the soil at once, but apparently the instinct to get away from the light is stronger than that to dig. When one was placed in a

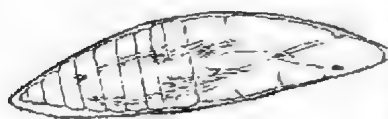


Fig. 5.

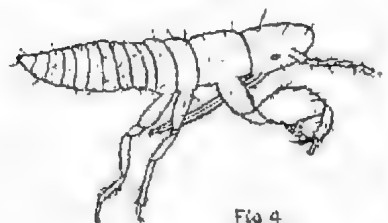


Fig. 4.

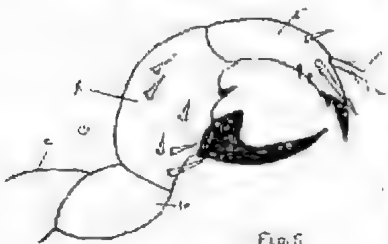


Fig. 3.

small glass dish of damp soil, which was packed down tightly, it walked over the firm surface for half an hour without making any attempt to dig down. However, when pin-holes were made on the surface of the soil, it immediately went into these, apparently seeking the dark. On loose soil with an uneven surface, the larvae found no difficulty in getting out of sight very quickly. Whether, in nature, should the ground be hard at hatching time, they would have to depend on the holes in the ground up which the nymphs had moved to the surface, for their first homes underground, I do not know, but no doubt they would take this easy route.

It might here be noted, that the fully-grown larva, or nymph, so well-known from its cast skin, found clinging to trees, etc., possesses similar digging fore-legs, the tarsus of which, however, is absent. In addition to the difference in bulkiness of the body, the large compound eyes and the bristle-like antennae of the nymph are a strong contrast to the minute simple eyes and the comparatively long antennae of the newly-hatched larva.

EXPLANATION OF FIGURES.

- Fig. 1. Photograph of twigs of Eucalypt scarred by *Cicadas* ovipositing.
- Fig. 2. Portion of egg-chamber showing arrangement of eggs.
- Fig. 3. Egg with larva seen through shell.
- Fig. 4. Newly-hatched larva.
- Fig. 5. Enlarged drawing of the digging fore-leg, showing the parts coxa (c), trochanter (tr.), femur (f), tibia (t), and tarsus (tar.).

EXCURSION TO FRANKSTON.

The outing to Frankston on Saturday afternoon, October 8th, was attended by 18 members and friends. After proceeding through Frankston Park and along the Tea-tree covered cliffs, the party turned into a large patch of fairly open country towards the Freshwater Creek. Wedding Bush, *Ricinocarpus pinifolius*, was here growing profusely and flowering freely, and numbers of the sweetly-scented Rabbit-ears Orchid, *Thelymitra antennifera*, were found. On a hill over which a fire had swept a few months ago, some good specimens of one of the Leek Orchids, *Prasophyllum*, sp.?, and the Red-beak Orchid, *Lyperanthus nigricans*, were collected; one or two specimens of the Hare Orchid, *Caladenia Menziesii*, were also noticed. The Coastal Tea-tree, *Leptospermum laevigatum*, was in full bloom, and appears to be in a flourishing condition, probably due to the presence of birds, 18 species being observed.—L. L. HODGSON.

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THE FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall, Victoria-street, Melbourne, on Monday, November 14th, 1927. The President, Mr. E. E. Pescott, F.L.S., occupied the chair, and there were about 130 members and friends present.

DEATH OF MEMBER.

The President referred to the recent death of Dr. George Horne, a member of the Club and a noted Ethnologist. Members stood in silence as a mark of respect.

CORRESPONDENCE.

From Chief Secretary for Victoria, intimating his approval of the proposed advisory Committee on matters pertaining to the fauna of the State, and suggesting that this Club should appoint representatives to act on such Committee when formed.

From Royal Zoological and Acclimitization Society, stating that it was intended to form an Advisory Committee for the purpose of assisting the Minister in matters pertaining to the fauna of Victoria, and asking the Club to appoint delegates to a conference in this connection.

From Minister for Lands, stating that enquiries would be made into the proposal to establish golf links in the Water Reserve at Cheltenham.

From Victorian Apiarists' Association, requesting the assistance of the Club in its efforts to prevent the depasturing of sheep on Crown Lands in the Grampians district, which caused the destruction of much native flora, and deprived the bees of pollen.

The matter of appointing delegates to the conference to appoint an Advisory Committee re native fauna was referred to the Committee.

Mr. V. Miller moved and Mr. H. B. Williamson seconded—"That the Club support the Victorian Apiarists' Association in its efforts to preserve the flora in the Grampians district." Carried unanimously.

REPORTS.

Reports of Excursions were given as follow:—Cheltenham, Mr. J. W. Audas, F.L.S.; Agricultural School, University, Mr. L. L. Hodgson; West Kinglake, Mr. A. J. Tadgell.

ELECTION OF MEMBERS.

The following were elected as ordinary members:—Miss A. Birch, 55 Livingstone-street, Ivanhoe; Mrs. G. E. McLaren, 3 Nyora-grove, Caulfield; Mr. D. H. Fleay, Ridley College, Parkville; Mr. Geo. N. Hyam, 144 Hampton-street, Hampton; Miss Jean Joshua, Whernside-crescent, Toorak; and as country members:—Mrs. J. C. Teare, Upper Fern Tree Gully; and Mr. and Mrs. A. E. Opperman, Croydon.

GENERAL.

The President announced that, subject to the approval of the Club, he proposed to arrange with the Tourist Bureau for competent members of the Club to accompany various excursions around Melbourne in order to explain the natural features of the localities visited; also that he was arranging for a series of natural history lectures to be delivered by Club members to the Boy Scouts of the Essendon district.

The President referred to a letter in the "Herald," over the name of the Government Botanist, relative to the finding of a new species of *Pultenaea*, and expressed his view that the discovery was important. He also referred to the work performed by Mr. H. B. Williamson, F.L.S., on the *Pultenaeas*, and asked members to congratulate Mr. Williamson, which was done with acclamation.

The attention of members was drawn to the donation by Mr. V. Miller, of a copy of "The Australian Encyclopædia," a notable work, in two volumes, and Mr. Miller received the thanks of the Club for his generous gift.

Reference was made by the President to the visit to Phillip Island, on November 26th, for the purpose of inspecting the Mutton-bird rookeries.

Mr. C. Barrett spoke regarding the proposal to throw open an area of the Upper Yarra country to sawmilling operations, and moved—"That the members of this Club are opposed to sawmilling operations being permitted in an area of the Upper Yarra watershed, and that a strong protest be made to the Government against the proposal." This was seconded by Mr. F. G. A. Barnard, and carried unanimously.

LECTURE.

A lecture was delivered by Mr. C. Barrett, C.M.Z.S., on various features of natural history observed during his recent visit to Central Australia, with the Reso party.

Mr. Barrett's remarks were illustrated with an excellent series of lantern slides depicting many aspects of aboriginal and other life.

EXHIBITS.

By Mr. C. Daley: Chipped Stones and Obsidian bomb from an aboriginal camping place south of Oodnadatta, S.A.; also seeds of *Abrus precatorius* ("Jequinity" or "Lucky-seeds"), used for ornament by aborigines in Central and Western Australia.

By Mr. J. C. Searle: *Apus australiensis* and *Estheria dictyon*, from Hamilton Bore, Central Australia; also *Nebalia* sp., dredged off Point Cook, and *Lipiduris viridis*, from Hampton, Vic.

By Miss J. W. Raff, F.E.S.: Cicada egg-nests, eggs and newly-hatched larvae, as described in November "Naturalist."

By Mr. E. E. Pescott, F.L.S.: Cultivated specimens of *Eucalyptus torquata*, *Hibiscus Huegelli*, and *Leptospermum Nicholli*; also specimens of aboriginal origin, from Central Australia, including stone knives and spearheads, churinga, pointing bone, etc.

By Mr. Geo. Coghill: Cultivated specimens of *Chamaelaucium uncinatum*, Geraldton Waxflower, and *Swainsona coronillifolia*.

By Miss F. Smith: Hymenopterous galls on Eucalypts, from Creighton's Creek. Almost every flower bud on the trees had been destroyed by this gall insect, giving the trees a very pretty appearance, as if covered with creamy-white berries.

By Mr. F. G. A. Barnard: Stick-insect (alive), from Croydon.

By Mr. C. J. Gabriel: Land shells from Central Australia: *Thersites adcockiana*, Bednall; *Thersites perinflata*, Pfr.; *Thersites sublevata*, Tate; *Thersites setigera*, Tate; *Thersites arcigerens*, Tate; *Endodonta aemula*, Tate; *Liparus Spenceri*, Tate; *Stenogyra interioris*, Tate.

By Mr. H. B. Williamson, F.L.S.: Specimen of Butterfly Flag (*Diplarrhena Moraea*, Labill.), collected at Timboon by exhibitor on 10/11/1926. (Not previously recorded for the South-west.)

By Mr. A. E. Opperman: Specimens of *Olearia myrsinoides*, *Melaleuca decussata* and *Chamaelaucium uncinatum*, from Croydon.

By Mr. C. Barrett: "Gibbers," from near Charlotte Waters (Sturt's "Great Stony Desert"); "bull-roarers," etc., from Central Australia.

By Miss Beatrice Barrett: Bean necklace, from Alice Springs district.

By Master Donald Barrett: Boy's shield and boomerang, from Horseshoe Bend, Central Australia.

The meeting terminated after the usual conversazione.

EXCURSION TO CHELTENHAM AND HIGHETT.

Seven members attended the excursion to Cheltenham and Highett on Saturday afternoon, October 15th. The day was pleasant and the flora was seen at its best. About 50 species of shrubs and other plants were noted in flower or fruit. The most abundant were:—*Leptospermum laevigatum*, *L. scoparium*, *L. myrsinoides* (with white and pinkish masses of blossoms); *Ricinocarpus pinifolius*, *Aotus villosa*, *Dillwynia cinerascens*, *Daviesia ulicina*, *Chamaescilla corymbosa*, *Dichopogon strictus*, *Olearia ramulosa*, *Burchardia umbellata*, *Helichrysum scorpioides*, *Pimelea humilis*, *Platylobium obtusangulum*, and *Kennedya prostrata*. Among smaller plants may be mentioned *Sebacia ovata*, *Rutidosia pumilio*, *Levenhookia dubia*, *Drosera glanduligera*, *Crassula macrantha*, *Bossiaea prostrata*, and *Isotoma fluviatilis*.—J. W. AUDAS.

EXCURSION TO AGRICULTURAL SCHOOL.

The excursion to the Agricultural School at the Melbourne University, under the leadership of Professor S. M. Wadham, on Saturday afternoon, October 29th, was attended by nine members. Professor Wadham, after briefly explaining the course taken by the students at the School, conducted the party through the propagating house and the wired-in experimental plots, where different varieties of wheat, barley, peas, etc., were being raised. It was mentioned that there were about 3,000 known varieties of wheat, some of which contained 14, some 28, and others 42 chromosomes in the nuclei of the grain. Those with 14 chromosomes would not cross with those containing a greater number, but the 28 and 42 chromosome grains would cross, though very often producing inferior grain, according to the varieties used.

The experimental plots of potatoes, grasses, and other fodder plants, such as lucernes, clovers, etc., were next visited, and the main characteristics of the different plants pointed out by the leader. Professor Wadham entertained the party at afternoon tea, and afterwards conducted us through the Museum attached to the School, where many interesting features were examined and explained. A vote of thanks was tendered to Professor Wadham and his assistant, Mr. O'Brien, for the interesting and instructive afternoon spent by those present.—L. L. HODGSON.

Corrigenda.—"Some Victorian Fossils" (Naturalist, November, 1927). Explanation of Plate. Parenthesis to the authority of Figs. 2, 4, 5, 8, 9, 10, 11 and 12, should have been omitted.

ANT LIFE IN CENTRAL AUSTRALIA.

BY CHARLES BARRETT.

On the Reso tour to Central Australia, in August, 1927, opportunities for natural history collecting were limited. But advantage was taken of every halt, delays while the cars were crossing the dry sandy bed of the Finke River, and an hour or two, morning and evening, around camping-places. A day at Alice Springs was most productive.

Devoting myself mainly to ants, I was able to make a fairly representative collection, which was given to the National Museum. Mr. J. Clark tells me that the collection includes several new species, and specimens of rare ants, already known. This material will be studied, together with the collections made by the Horn Expedition, and naturalists who visited the Central region more recently.

Ants, of course, are the most conspicuous and abundant insects in Central Australia—with the exception, perhaps, of flies, in summer time! There is not a distinctive ant fauna—a number of species confined to the Central region. All, perhaps, are arid country forms, but the known species are widely distributed, Mr. Clark informs me: some range right across the continent and are familiar in Western Australia; others have been recorded from Western Queensland.

On the Burt Plain, north of the Macdonnell Range, crater-nests of *Polyrachis* (*Campomyrma*) *macropus* Wheeler, are a feature of the landscape for many miles. Through the mulga scrub, craters are so numerous in some places, that 50 or more could be seen almost at a glance. We dug out one nest, and found that the "living apartments" were several feet down in the hard dry ground. For coolness and moisture, ants must tunnel deeply in Central Australia. They accommodate themselves to circumstances. Ants of the genus *Polyrachis*, in Victoria, for instance, commonly nest under logs and stones. *P. macropus*, I believe, is the only Australian member of the genus known that builds crater-nests. The craters are large and often fairly high. They are covered—a kind of shingle—with dry mulga leaves, which also are scattered around in thousands. The object, it has been suggested, is to safeguard the nests from flooding in a season of generous rains. But more probably, while the thatching tends to conserve

such moisture as exists beneath the surface, the craters may serve chiefly as a protection against sand-laden wind: nest-entrances, lacking craters, might easily be "smothered."

Forel has observed, as Wheeler remarks in his fascinating chapters on Ant-nests (*Ants*, pp. 192-224), that the walls of craters formed by desert ants, such as *Messor arenarius*, of the Sahara, are built up to a greater height on the windward side. The Australian ants of the genus *Aphænogaster* are widely distributed, and *A. longipes*, F. Smith, is perhaps one of the commonest; it ranges from the Tropics to



Photo—C. Barrett

Crater-nest of *Polyrachis macropus*.

Victoria, and Melbourne is the type locality. Now the *Aphænogaster* ants are notable excavators, and a colony may build up numbers of craters around the nest openings. Some of these walls of earth-pellets and tiny grains of sand, are perfectly formed; others are carelessly made. I have counted nearly 40 craters along a few yards of country roadside. But almost anywhere around Melbourne, *A. longipes* is to be found, and its nest-craters, and irregular little tumuli over and around embedded rocks and logs, are familiar objects.

Many of the beautifully rounded craters formed by *P. macropus* could barely be covered by a large hat. They are cleverly thatched, all over the exposed surfaces, including the inner slopes. Two or three may be grouped so closely that their bases are merged; usually they are a few yards apart; here and there, one quite isolated is seen. Captain S. A. White's photographs of *Polyrachis* craters, in the Everard Range (*Trans. Royal Soc., South Aust., XXXIX., 1915, pl. LXV.*), created much interest, revealing, as they did, the very distinct nesting habits of an Australian species of *Polyrachis*.

The crater-building species was one of the novelties in Captain White's collection of insects from the north-western region of South Australia. It was originally described by Wheeler as *P. longipes*; but subsequently the specific name was found to be pre-occupied.

At Alice Springs, and in other localities, I found colonies of Honey-pot ants, *Camponotus inflatus*, Lubbock, but failed to take any repletes. Ordinary workers were discovered under stones, and were very quick upon their ways. The nest-tunnels were long, and in ground so hard that digging-out was a task for which time was lacking, with so much else to be done.

In a romantic and lonely spot, the Ooraminna Rock-hole, a new species of *Camponotus* was taken. When picking up flint scrapers, broken stone knives, and other relics of the aborigines, I noticed ants issuing from a small hole in the ground. Close by lay a nearly perfect knife, fashioned in stone, perhaps a hundred years ago.

Formerly Ooraminna Rock-hole was worth visiting as an "art gallery" of primitive man. But the rock-drawings have either been defaced by vandals, or worn away. There are modern "paintings," probably the work of Afghans and white men, with a twisted sense of "humor," camping at the hole, which years ago, was walled across, to form a reservoir. It was dry on the occasion of our visit.

My Central Australian collection includes specimens of 26 species of ants. The sub-families Ponerinae, Myrmicinae, Dolichoderinae, and Formicinae, are represented, the latter by four genera and 10 species (of which two are undescribed). There are five species of *Iridomyrmex*, including the widely-distributed Mound-ant, *I. detectus*, Sm., and the variety *viridiaeneus*, Vich., This variety is a very beautiful ant, the body of the

worker being rich metallic-green, while the gaster shows violet reflections. The nest was revealed only by a slit-shaped opening—there was no mound.

At Blood's Creek, when seeking Lacewings by torch-light, I noticed large "sugar-ants" (*Camponotus*, sp.) issuing from moundless nests, with slit-like orifices. In the day-time these nests had been overlooked, the ants being underground: they are nocturnal hunters.

Odontomachus rubriceps, Forel, was found among the rocks at Alice Springs. The nest was in ground so hard that it had to be chipped out with a sheath-knife. The rock and the earth were hot to the touch, but in shady nooks and crevices nearby grew ferns of three species, *Cheilanthes vellea*, F.v.M., *C. tenuifolia*, Swartz, and *Grammitis rubraefolia*, F.v.M., ferns with cool, green fronds, that told of moisture.

I am indebted to Mr. J. Clark, F.L.S., for his kindness in identifying the ants of my Central Australian collection.

BLUE-TONGUE LIZARDS IN CAPTIVITY.

About two years ago I brought home from the hills a young Blue-tongue Lizard (*Tiliqua*), about four inches in length. After a few weeks' captivity, it disappeared. But recently some neighbours sent word of the presence of a "big lizard" in their garden. Collecting the spoil, we found a splendid sample of a full-grown Blue-tongue, and in all probability, our friend of two years ago. Now he is in an enclosure, feeding voraciously on Cape Weed flowers and snails.

We have kept an assortment of Blue-tongues for many years. One individual was kept for about six years. Then it disappeared, and over a year afterwards we had news of its accidental death, in a neighbour's garden, during grass-mowing operations.

The diet of our lizards has been very varied. Minced steak is a popular food, but they do not care to eat too freely of this. Finely-chopped carrots are gladly accepted; chopped lettuce is always refused. Cape Weed flowers are eaten greedily, on account of both nectar and pollen contained in the flowers. Dandelion flowers are not relished so much; neither are flowers of the Sow Thistle. Perhaps the most popular item in the daily diet is snails (*Helix aspersa*). The shells must be broken, as the lizards do not understand how to break them. One of our hungry lizards, which had not been recently fed, managed a meal of 24 large-sized snails.

Milk, in almost any form, is greatly relished. Our lizards, unless well fed, never refused cream, custards, rice or sago custards, and similar foods. Evidently the Blue-tongues are fond of a mixed diet.—E. F. PESCOTT.

THE HISTORY OF THE FLORA AUSTRALIENSIS.

BY CHAS. DALEY, B.A., F.L.S.

DR. JOS. D. HOOKER'S CORRESPONDENCE WITH BARON
MUELLER.

PART VI.

The letters of Dr. Hooker reveal the kindly, sympathetic, and frank character of their writer.

Dr. Hooker was of a genial nature, genuinely interested in Mueller and his work, and with a greater capacity for friendship than Bentham.

In consequence, the relations between Hooker and Mueller for forty years were of a most cordial character, revealing a pleasing, mutual interchange of views, advice, and confidences until the death of Mueller ended the connection.

Part of Dr. Hooker's letters are contemporaneous with those of Bentham, and throw sidelights upon the collaboration of the two great botanists in their work upon the Australian Flora. In addition, the letters show the reciprocal relations between Kew Herbarium and the similar institutions directed by Dr. Mueller in Victoria.

The incidental knowledge conveyed in the letters in regard to the great English institution, and also in reference to features connected with Australian Botany, is instructive, and interesting; whilst in the last letters there is matter of a more intimate personal nature.

It has been previously mentioned that Dr. Hooker, after the year 1857, had taken over, as was natural, the greater part of his father's correspondence with Mueller. Sir William was getting old, his time was fully occupied, and Dr. Hooker had abundant energy and activity, and bore the brunt of the management and organisation of the Kew Herbarium. Mueller's collections, as well as the business arrangements for the Flora, were mainly conducted through the Herbarium, besides which there was the regular interchange of specimens and ideas on botanical matters.

Writing in August 23rd, 1858, Dr. Hooker acknowledges receipt of MSS., and some Van Diemen's Land specimens, and writes, "I am perfectly amenable to all your strictures on the *Flora Tasmaniensis*. No one has any idea how important all such works must be. Everything seems clear, and easy, and accurate, till another goes over the same ground."

He breezily comments on several species:

As to *Dennisonia*, it is a miserable-looking plant to be the name of the King of Australia,* and its dependencies. Can you find no better plant for his honor?

I have no doubt you are right as to several of my *Epacris* being bad species, and you will do a prodigious service by reducing the species of this and many other plants within their just limits. *Leucopogon* is in a terrible chaos, *Melaleuca* is worse, as to *Eucalypts*, I hope your cortical characters will prove as infallible as you think they are, but Brown seemed to think that perhaps you had systematized too much upon it.

Hooker then warns Mueller about hasty publication of grasses and monocotyledons.

"Botanists should work at the variation of species, and a good paper from you on the limits of variation of the Victorian genera,—especially such as *Epacris*, *Leucopogon*, etc.,—should immortalize you more effectually than describing new species without proper material of books and Herbarium."

On December 20th, 1858, he writes from experience:—

"I know nothing so difficult as keeping these booksellers in tolerable order. They plague us out of our lives here with dilatoriness, overcharges, incomplete copies, etc., etc. I must now beg your acceptance of my remaining colored copy (of *Flora Tasmaniensis*), which I shall send to Pamplin for you.

I gave the two previous two parts to my father to send to you, and I doubt not they have gone astray amongst his multifarious correspondence, but we really are overwhelmed here with duties of this sort.

I am quite prepared to accept your opinions at many of my species being bad ones. I look at all systematic work as approximate only, and full of errors. . . . I find that those called critical botanists are just as fallible as others."

He discusses points of difference, then frankly resumes:—

"I have studiously abstained from publishing any Victorian plants, although I have a great majority of them from Cunningham, Robertson, and others, because I knew you were at work on that Flora, and liked to have the credit of naming your plants. You again go on naming and describing Tasmanian plants, although you know I am engaged on that flora.

Many persons would take great umbrage at this, but I assure you I do not at all. You further ask me now to give up the Chatham Islands flora, which I do most willingly, though I should not in fairness hide from you that I do not think the request reasonable, as you do not leave the Tasmanian plants to me. All I can say is that I shall always welcome your labours in any form, and beg you to be assured that I hate reclamations and jealousies, so pray describe Chatham Islands and Tasmanian and Indian plants too, if you wish. You must not expect, however, that, when I have reason to work at unpublished plants to which you have given MSS. names, I am to take your names wherever the species are good only, as a

*Sir William Denison (1804-71) Governor of Tasmania, and in 1855 Governor of N.S. Wales, nominally Governor-General of Australia.

matter of course; hitherto I have done so, and have not quoted your MSS. names."

Concerning De Vreise's *Goodeniaceae*,—he states:—

"Most unfortunate attempt. Any comment upon it without access to the material from which he worked, cannot but add to the confusion he has already made."

In systematic botany even the best botanists are often at fault, and I find it impossible to identify many of Brown's described Tasmanian plants without access to the specimens.

The *Cyperaceae* have cost me many weeks of labour, your specimens have been invaluable, though like my own, often wrongly named. The long and short of the matter is that Systematic Botany is a much more laborious and critical operation than anyone concludes who has not access to a large Herbarium and Library, and the quantity of scattered dismembered materials in the shape of genera and species now daily being further and more widely scattered through periodicals of all kinds threatens to render the effectual study of species impossible at no distant date."

In a later letter there is an allusion to Brown's death, and the statement,—“My father and I drew up a report on your whole Botanical career in Australia for the Colonial Office, but we have had no copies sent of it nor seen it in print.”

In connection with Mueller's report sent to the Linnean Society, the Colonial Office declined to pay for the printing. Hooker's comment is, “Very shabby to a private scientific society.” However the Linnean Society printed it, and also a paper on *Acacias* and *Eucalypts*.

“I am extremely obliged to you for your numerous and valuable corrections to my faulty *Flora Tasmaniensis*. You will doubtless reduce my species very much, and no one will be more glad than I to have this done for me.”

It will be noted that there is a refreshing candor in Hooker's references, not only to the work of Mueller and others, but also to his own.

The next letter is dated October 20th, 1860, from the British Consulate, Jerusalem. Hooker, having six weeks' leave, is visiting Syria, and is to return home by Caïpha and Beyrout—through North Syria, Lebanon and Anti-Lebanon to Damascus. The country, as regards vegetation is “dead.”

He writes to Mueller for Australian seeds as a means of remedy “towards improving this interesting locality.”

“The soil and climate are admirable, and the country is cursed by man and man's work alone. I believe that many Victorian seeds would succeed here better than those of any other country, and I know you would be proud to be the instrument of populating the country with arborescent vegetation. No one could do it so well as you, and no plants would

succeed better than Australian. The quick-growing ones would be the most important ones, as shade and breakwind of plants that will withstand drought is the first requisite.

The following would be desirable:—

Bluegum, Peppermint, various Acacias, Casuarinas, Callitris, Melaleucas, Anthistiria, and other dry-climate large groups.

Pomaderris, Banksia, Hakea, Grevillea, etc., etc. . . . You can, from the above list, judge better than I can, what would be acceptable. Please put on each packet whether tree, shrub, or grass. This is more important than the scientific name."

This was a practical proposition in afforestation to which Mueller, who was the first to decry the evils arising from the destruction of the forests in Victoria, gave his sympathy and active support.

From Kew, November 20th, 1860, Hooker writes that he has returned home, and on Mueller's account had sent £65 for Royal Society Membership. He is "glad that excellent, elaborate and careful Flora of Victoria is making good progress," and reports that a genuine, scientific Natural History review is to be established, Mr. Oliver, librarian at Kew, edits *Phanerogamic Botany*; Mr. Cury, *Cryptogamia*—the best men for the purpose. It will be a quarterly review, with a quarterly bibliography, and Hooker (Senior) will publish *Ferns*.

On May 24th, 1861, from Hetcham, Ipswich, Hooker wrote the letter which evidently had the greatest influence in finally reconciling Mueller to the abandonment of his plan for writing the Australian Flora, and in inducing him to collaborate whole-heartedly in its publication by Bentham.

From Kew, September 22, 1861, Hooker advises that he is sending some plants from North Africa, "not many but very choice," and gives the encouraging note, "Your seeds are growing famously at Jerusalem." He expresses satisfaction that Mueller is gratified with election to the Royal Society without any opposition whatever.

On December 8th, 1861, he remarks, in reference to the decision concerning the Australian Flora, "I am sure you have acted both liberally and wisely." I very much hope that you will get on with Victorian Flora—it is a capital work and will cost you more labour than perhaps you anticipate to complete it." He mentions that three years have been spent on the first volume of *Genera Plantarum*, which is in course of publication, and refers to the plant *Welwitschia*, received from Damara Land, "Certainly the most marvellous plant discovered since

Botany was systematized, more curious certainly, though less striking in some points than *Rafflesia*." Later, of the same plant, "It is incomparably the most marvellous plant found in any country."

On December 24, 1862, he acknowledges exchanges, and is sending seeds of duplicate plants, and states that his father is counting on "the unrivalled woods of Victoria for the Exhibition,"—a selection having been made for him by Mueller.

In December, 1863, Dr. Hooker speaks of domestic afflictions, and in December enquires about Augustus Oldfield, a contributor of specimens to the *Flora Tasmaniensis*. "I have plenty always to say to you, but no time to say it now." He asks for terrestrial orchids, preferably the tubers in the dry season, and bulbs of all kinds from Australia will be acceptable.

Referring to information Mueller had by request supplied about the natives of Australia, he conveys the thanks of Sir John Lubbock for the same.

On March 19th, 1864, Dr. Hooker is busy preparing to publish Part I. Phanerogams of the New Zealand Manual on Botany. He is glad at Mueller's pleasure at Oliver's notice of the *Flora Australiensis* in the Natural History Review, and later advises that Sir Phillip Hodgson will personally deliver the papyrus at the Melbourne Gardens.

On September 19th, 1864, he notifies sending to Mueller's order a dissecting instrument at a cost of twenty shillings. It has triangular, pointed needles considered the best, and easily sharpened on a hone. A copy of the New Zealand Handbook is enclosed.

Information is asked about the blacks of N.W. Australia,—whether it is a fact that there is an absence of canoes among them, and if so, is it because timber is wanting; also whether stone implements are rough or polished, loose or mounted for use, and whether Mueller has seen them in actual use, and for what purpose.

Bentham and he are still at *Genera Plantarum*. They have to publish the second part before being repaid half the outlay on the first.

From Kew, on December 2nd, 1864, was sent a reply to letters from Mueller, showing, under sense of aggrievement, signs of acerbity and irritation. Dr. Hooker points out the injustice and unwisdom of statements made, and vindicates Bentham and himself from undeserved re-

proaches. The mutual misunderstandings being cleared up, cordial relations continue unaffected.

On February 17th, 1865, a consignment of trees and shrubs is reported as being sent to Australia, and the writer mentions that his father, Sir. William, is better in health; then later, that he is seriously ill from bronchitis. Dr. Hooker is overwhelmed with work, but his father will write to Mueller. He is sending packets of fresh seeds from the Hebrides, also live plants.

Sir William Hooker died in 1865, and Dr. Hooker had also been seriously ill. On October 9th, 1865, from Buxton, Derbyshire, where he had been convalescing, he writes, saying that Bentham had promised to write to Mueller, and he gives eloquent, filial testimony to his father's work.

"My loss has indeed been a grievous one, my father having been for so many years more my daily companion than any other person. I shall never see his equal for liberality of purse and work to Library and Herbarium, for genuine kindness, for utter absence of self-love or self-esteem, and for single-minded devotion to science. He thought nothing of himself in these matters, and scrupulously avoided applause, flattery, and distinction. These attributes brought their own reward. He lived and died more happily than any scientific man I know, and had not a single enemy or detractor.

I do hope, my dear Dr. Mueller, that our correspondence may continue. I have been for nearly three months forbidden to do any duty, and so do not pretend to answer any of your late letters to my father or myself till my return to Kew."

Later from Kew, in reporting the sending of a box of succulents, and the receipt of seeds, he anticipates changes in the management at Kew, and mentions the offer of Hooker's Herbarium to the English Government for £6,000, with selection of all books wanted to complete the Library. This offer was at a later date accepted.

On March 1st, Dr. Hooker is sending to Mueller Part I. of *Synopsis Filicum*, Papyrus, and also seeds of a *Dracaena* from Cape Verde. Later he is to send fern-spores, and young plants of the Autumn Crocus, seeds of water-plants, and West Indian orchids. The Orchids from Australia have not yet arrived, but the *Xanthorrhoea* is doing well.

On January 11th, 1867, Hooker has received two plants of *Correa Lawrenciana*. He writes, "The last big Tree-fern sent is growing magnificently, and the *Todea* gets bigger and bigger every year. It must have five or six hundred fronds on it." Of this *Todea*, sent some

time before by Mueller, Dr. Hooker was extremely proud. At this time he is preparing his Presidential Address for the Royal Society. He mentions receiving a *Xerotes* or rush-basket, also *Goodenias*.

August 4th, he is enquiring for *Anigozanthi*, or Kangaroo-paws, of which they have only two at Kew. The *Diuris* and *Pterostylis* Orchids are in flower.

January 18th, 1869, he has written in vain to Madeira and Teneriffe for plants for Australia. He asks for *Blandfordias* and other bulbs, and acknowledges receipt of cases.

In January 14th, 1869, he tells Mueller of a request made by Nordlinger for specimens to be cut from a fine series of polished slabs of Australian trees, and quotes part of his answer,—“Cannot comply with your request with regard to Australian woods.” All are slabs polished to show the nature of the grain for art purposes, the cutting-up of which would disfigure the collection.

“The *Todea* is growing vigorously, and will make a grand show by next summer.”

March 19th. He asks for plants and seeds of *Banksias* and *Epacrids*, and states that Schomburgh, at the Adelaide Gardens has sent magnificent *Xanthorrhæas* living. He requests good plants, four feet in length of *Xanthorrhæa arborea*, *X. australis*, and *X. hastilis*.

May 14th, 1869. He has received packets of *Epacrid* seeds, and writes,—“We have abundance of *Dicksonia antarctica*, *Alsophila australis*, *Cyathea medullaris*, we want good small trunks of the other Australian Tree-ferns. The Herbarium has received four or five *Xanthorrhæas* from King George's Sound. Regarding the *Eucalypts* at Kew, he says:—“*Eucalyptus polyanthemos* is the only *Eucalypt* that will stand an ordinary winter with us . . . we have tried scores of others.”

Mueller had promised to send “the King of *Todeas*.” On July 11th, 1869, Dr. Hooker writes thanking him:—

“What a figure it will cut at Kew! I saw 2 superb ones at St. Petersburg. You shall have the spores of our Ferns and a case of live ones as soon as we get a foreman. . . I fear, however, that you will not find it easy to grow from spores and cultivate as you anticipate, from the great difficulty in such establishments as yours of keeping up a uniformly good temperature and shade. We, on the contrary, find *Epacris* easy enough of cultivation if we could only get them; but, of the hundreds of Australian species of the Order, we have not a score!

We have now 3 species of *Xanthorrhæa* growing, *pumilio* from you, 4 *angulata* from the South, and another, *australis*? from Schomburgh, the two latter about 4-5 feet high.

I fear that on this side of the world we think the reverse of what you do, in reference to the debt between Kew and Melbourne. Your Ward's Cases arrive in such woeful condition; our foremen complain that you send on duplicates year after year. You send us much better reports of the condition in which our cases reach you, though it is now too long since we have sent you any. We have a case of Bamboo now establishing for you.

I think that you will find about the beginning of my taking charge, that we kept you in our debt with boxes of Orchids, Bromeliaceae, Cacti seeds, and Ward's Cases of rare plants, but that lately we have fallen off, which is much due to the fact that for three years my own and the men's time have been taken up with the re-organization of the Gardens, reconstruction of houses and erecting apparatus, which has thrown us altogether out.

I can quite understand your anxiety about the Cryptogams of Australia, and I am sure I will gladly help you, though of all the worries I know, this of Cryptogamic Botany is the greatest—to get the Australian Cryptogams even undertaken will require a lengthened correspondence which I really cannot undertake.

The first thing to be done is to select workers, to give them an idea of how much they will have to do, how they are to do it, how long they are to be, and what pay they are to get. A condition with all must be that they revise (at least) their matter at Kew. Then when the MSS. is prepared, you will want a skilled Editor to see it all through the press, who will see that there is some uniformity in the matter, and especially in the form and style.

I can give you an idea of the trouble I had with all my Cryptogamic Floras to get the matter of each author into shape. Each author had his own notion of what should form a description, a diagnosis, a genus, a class, a species, a variety, a tribe, an order, a family, and so forth; so, too, with the matter and manner of the description, of synonymy, of quotations, of giving habitats, etc., etc. My correspondence with some of these collaborators fills volumes. Lastly, each has his own terms to express one and the same structure and organ, and the confusion is hence terrific.

The Cryptogamist cannot or will not come to Kew to work, and without access to books and herbaria, they never can identify their species.

Poor Berkely's health is worse and worse, though he continues working at your *Fungi*. No two authors are agreed upon *Hepaticae*, fewer on Mosses, and as to Lichens, the whole subject is in chaos, as it appears to me."

Mueller has despatched the promised *Todea*, concerning which Hooker jubilantly writes from Kew, on September 10th, 1869:—

"The portentous and prodigious *Todea* arrived yesterday in splendid condition, with hundreds of pink and white fronds pushing through the saw-dust. We shall make a nidus for it with a watery bottom in a shady part of the Temperate House, where I do not doubt it becoming a grand feature in the House-scope. It is the finest thing we have had for many a long day, and I cannot thank you sufficiently for it. We shall do our endeavour to send you a suitable return. I think we had better send case after case of *Nepenthes* till you get one alive. This we must do through careful ship-captains. As to *Sarracenias*, we have plenty, but they present more difficulty."

He suggests sending them in Spring—selected, best plants in small Ward's Cases, overland, if someone can be got to look after them.

"The P. & O. seem to take a delight in knocking Ward's Cases to pieces or putting them in the hold or near the engine.

Would not saw-dust make capital packing for the ferns? We now rarely get them with life in them even from Calcutta. Depend upon it, we shall do our best for you.

Nepenthes takes any amount of heat and moisture, and rather likes shade. *Sarracenia* you must keep cool, moist, and shady with plenty of lycopodium among them. With moderate ferns 2 to 4 feet, do not remove any fronds, young or old, but fold them down carefully along the trunk. Have you any Australian name for the *Todea*? 'Fern Royal' I call it."

It would be of interest to know if this name is the forerunner of "King fern," which now we apply to the *Todea*.

(To be continued.)

EXCURSION TO ELTHAM.

Some 30 members and friends attended the excursion to Eltham on Saturday, November 12th. The first nests noted were those of White-Winged Choughs, *Corcorax melanorhamphus*, some of which were occupied. The next nest inspected was that of a pair of Olive-backed Orioles, *Oriolus sagittatus*, built in a sapling near the track, and containing one young bird—the remaining one of three—which flew out of the nest, protesting loudly. The party followed the creek to a large White-Gum, where a pair of White-fronted Herons, *Notophox novae-hollandiae*, had their large stick nest, high on a horizontal branch. Four Herons, about three weeks old, were standing erect in the nest.

Another interesting subject was a pair of Orange-winged Nuthatches, *Neositta chrysoptera*, busily engaged putting the finishing touches to their small, felted nest, in the forked branch of a Box sapling. Close by, a male Pied Triller, *Lalago tricolor*, was sitting on a nest high in a Stringy-bark; and within a few yards a Brown Flycatcher, *Microeca fascians*, was sitting on a tiny nest containing two fledglings. Near by, a White-browed Wood-swallow, *Artamus superciliosus*, had her nest in a Stringy-bark. Black-faced Cuckoo Shrikes, *Coracina novae-hollandiae*, were flying around, and Rufous Whistlers, *Pachycephala rufiventris*, were much in evidence.—W. C. TONGE.

THE CLUBMOSSSES OF VICTORIA.

BY H. B. WILLIAMSON, F.L.S.

By the popular terms "Ferns" and "Clubmosses" has been known the Division Vascular Cryptogams, by which is meant all flowerless plants (i.e., not provided with stamens or pistil) reproduced by spores, and having true stems enclosing bundles of vascular tissue. These plants are divided into two classes:—

FILICALES:—Plants with large leaves (or fronds) usually divided into small segments, and with spores in spore cases (sporangia) in clusters on the under surface.

LYCOPODIALES:—Plants with small leaves, undivided, with spore cases sessile in the axils of the leaves.

The terms "Ferns" and "Clubmosses" have been used as vernaculars for these two classes at a time when Filices and Lycopodiaceae were the botanical terms accepted. The present classes, Filicales and Lycopodiales do not exactly coincide with the old Filices and Lycopodiaceae; for instance, the genus *Azolla*, which was included under Lycopodiaceae, is now placed with Filicales. However, the popular terms cited may be accepted as good vernaculars for the two classes of Vascular Cryptogams.

The Ferns of Victoria have been dealt with in previous articles in this journal, and an attempt will now be made to present the few Clubmosses (12 species) in such a way that they may be easily identified.

Class LYCOPODIALES.

Family LYCOPODIACEAE.

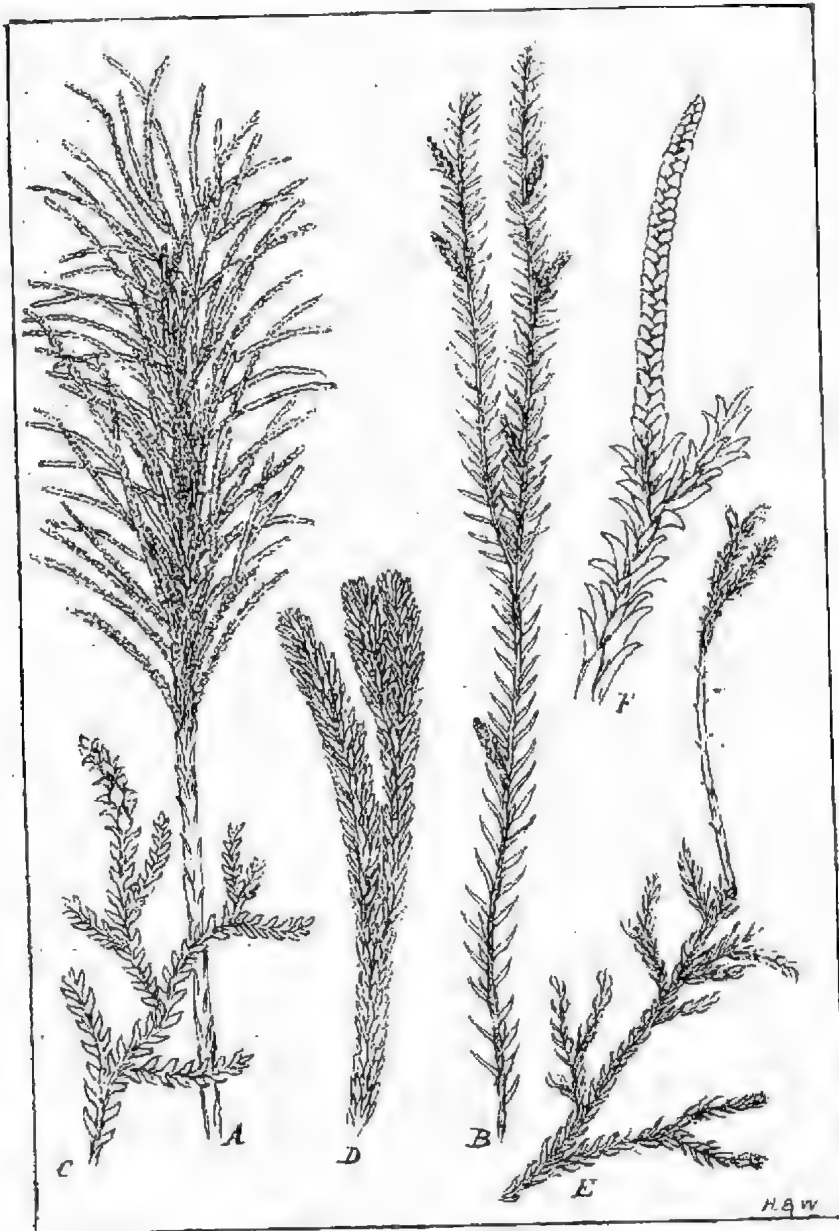
Genus PHYLLOGLOSSUM.

PHYLLOGLOSSUM DRUMMONDII, Kunze. Pigmy Clubmoss.

This tiny plant may be looked for in swampy ground in most parts of the State, and is often easily picked out by the yellow of its fruiting spike, though only about an inch high. At Mildura it has been found in the clay alluvial of the Murray flats quite away from other vegetation. It rises from a tuber of the previous year, and produces from three to seven linear radical leaves about an half inch long, from among which rises the fruiting stem topped by a cylindrical spike of bracts bearing kidney-shaped spore cases. It is confined to Australia. (W.A., Tas., N.S.W., Vic.).

Genus LYCOPodium (6 species).

Two of these have been found near Melbourne, the others being alpine plants.



(a) *Lycopodium densum*. (b) *L. laterale*. (c) *L. scariosum*.
(d) *L. Selago*. (e) *L. clavatum*. (f) *L. varium*.

LYCOPODIUM DENSUM, Labill. Bushy Clubmoss.

In all districts of Victoria except the North-West, including the Dandenong Ranges, this much branched species may be found, rising from underground stems usually to about a foot in height, appearing somewhat like a miniature conifer. The leaves are pointed and very much crowded, up to $\frac{1}{2}$ inch in length on the stem, and only about $\frac{1}{3}$ inch on the branches, which are dichotomous (2-forked). Spikes bearing spore cases are terminal, erect, and up to an inch in length.

It occurs in Polynesia and New Zealand as well as in all Australian States except W.A.

LYCOPODIUM LATERALE, R.Br. Slender Clubmoss.

This is distinguished from the last-named by having very few branches, often none at all, and by its lateral fruiting spikes. Leaves are crowded, very narrow, and about $\frac{1}{4}$ inch in length on the stems, about 10 inches high, rarely 2 feet. It is common in the Grampians, and has been gathered in the Sandringham district. The distribution is the same as that of *L. densum*.

LYCOPODIUM SCARIOSUM, G. Forster. Spreading Clubmoss.

This species, recorded for Victoria so far only the Baw Baws and "Sources of the Yarra" is distinguished from the remaining Victorian species by having its leaves in two rows (distichous). Between these rows are smaller, appressed, stipule-like leaves. It is a much spreading or trailing plant, with shortly ascending branches. Its fruiting spikes are terminal, about $\frac{1}{4}$ inch in length, with spore-case-bearing bracts broad, with scarious edges and spreading tips. It occurs also in Tasmania, New Zealand and America.

LYCOPODIUM SELAGO, L. Fir Clubmoss. (Conifer-like branches).

This also has been recorded from the Baw Baws, though apparently rarely gathered there. Other localities are Mt. Hotham and adjoining peaks. Bentham's description includes the following:—

"The stems are scarcely creeping, though slightly decumbent and rooting at the base, the forked and erect branches forming dense level-topped tufts 3 to 6 inches high, completely covered with their crowded but spreading dark green leaves, not forming a distinct terminal spike as in most of the species."

In Australia, it occurs in N.S.W. (Alps), in Tasmania

and New Zealand. It also grows in Europe, Asia, Africa and America.

LYCOPODIUM CLAVATUM, L. Common Clubmoss.

This may also be looked for on the Baw Baws and on all the alpine highlands, and is the most widespread of the highland species. The author found it at the head of the Dargo River, and was told at the St. Bernard Hospice that it was the "Dargo Fern." It most resembles *L. scariosum*, but it is easily known from that plant by its narrow, incurved, much pointed leaves, crowded all round the stem, and not distichous, and by its long-stalked fruiting spikes. These spikes are two or three together at the end of a peduncle, two or three inches long, which is provided with scattered, small, narrow bract-like leaves. Besides the alpine regions of N.S.W. and Tasmania, it occurs in Europe, Asia, Africa, America and Polynesia.

LYCOPODIUM VARIUM, R.Br. Tall Clubmoss.

A very rare plant in Victoria, having been found only at Genoa Peak. It differs from *L. Selago*, in having stems elongated, and ascending, with bracts of the spike smaller than the stem leaves, which are somewhat longer than those of *L. Selago*. It is found also in Tas., N.S.W., N.Z., the Pacific Islands, and South Africa.

Family SELAGINELLACEAE.

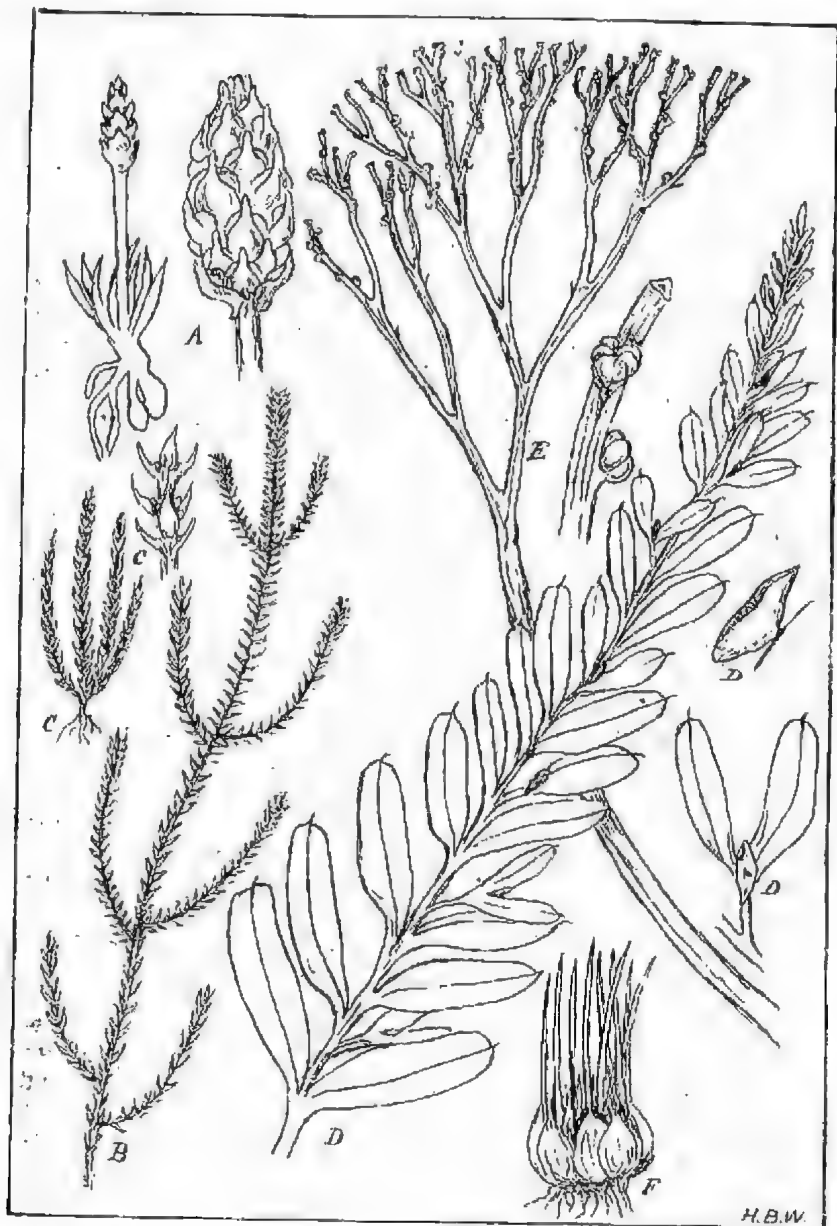
Our two representatives of this family are easily mistaken by their general appearance for *Lycopodium*, but the family stands apart in having spore cases of two kinds, small ones filled with minute powdery spores (microspores), and large ones containing from 1 to 6 large spores (macrospores), all the spore cases being placed in the axils of bracts in terminal spikes.

SELAGINELLA ULIGINOSA, Spring. Swamp Clubmoss.

A very common species, found in all the districts of the State except the North West. It rises from a perennial rhizome, with very slender but stiff branches, sometimes amongst vegetation to a foot or more. The leaves are scarcely $\frac{1}{2}$ inch long, in four rows, scarious and spreading, or even reflexed, crowded near the summit to form terminal spikes, with the bract-like leaves enclosing the spore cases. It is confined to Australia, and occurs in all the States.

SELAGINELLA PREISSIANA, Spring. Tiny Clubmoss.

Distinguished from the preceding species in being an annual, branching scantily from near the base, rarely reaching to 2 inches in height, and by having spore cases



(a) *Phylloglossum Drummondii*. (b) *Selaginella uliginosa*.
 (c) *S. Preissiana*. (d) *Tmesipteris tannensis*. (e) *Psilotum*
nudum. (f) *Isoetes Drummondii*.

along the greater length of the branches. Leaves are similar to those of *S. uliginosa*, but rather smaller. The distribution is the same, except that it has not been recorded from the northern districts of the State.

Family PSILOTACEAE.

The plants of this family have their spore cases, two or three together, united into a two- or three-celled capsule or sorus sessile at the base of bifid bracts or scales.

Genus TMESIPTERIS.

Stems simple, leafy, sori usually two-celled.

TMESIPTERIS TANNENSIS, Bernhardt. Fern Clubmoss.

A fern-like plant often found in the Dandenong and Gippsland fern gullies growing from slender, creeping rootstocks on fern trunks, and reaching sometimes a foot in length. Its leaves are vertical, sessile, somewhat decurrent on the stem, about an inch long, blunt and with the midrib produced at the end into a fine point. Along the upper half of the frond are leaf-like bifid bracts on stalks about $\frac{1}{4}$ inch long. The capsule-like sori, broader than long, are sessile at the junction of these bracts. It occurs in Polynesia and New Zealand, as well as in Tas., N.S.W., and Queensland.

Genus PSILOTUM.

Stems dichotomously branched, leafless, with distant minute scales. Sori usually 3-celled.

PSILOTUM NUDUM (L.), Griesb. (P. TRIQUETRUM, Sw.). Skeleton Clubmoss.

A rare plant in Victoria, being found until recently only on Mitre Rock, near Mt. Arapiles. During the recent Western District F.N. Club Excursion, Mr. C. Barrett discovered it at Mt. Zero. Growing from rock crevices, its forked leafless branches of a yellowish green colour make it an easily recognised plant, though it has possibly been passed by as a young *Exocarpus cupressiformis* or *E. stricta*. Spore cases are usually three together, united into a capsule-like sorus, nearly globular, 3-celled, 3-lobed, opening by three valves. The bracts are bifid and very small. Stems are erect, or when on trees pendulous, 3 inches to over a foot long, the fertile branches 3-angled (hence Swartz's name), and the barren ones usually flattened. Linne's name for the plant was *Lycopodium nudum*, and Swartz was wrong in changing the species name when he removed the plant into the genus *Psilotum*. Griesbach made the necessary correction. It occurs in most regions of Europe, Africa and America. In Australia it is confined to Vic., N.S.W., and Qld.

Family ISOETACEAE.

Genus ISOETES.

ISOETES DRUMMONDII, A. Braun. Quillwort.

A peculiar, stemless, semi-aquatic plant found also in N.S.W. and W.A. The few plants of this genus are either submerged or growing in swampy places. The author found this species during the month of March in a swamp, in which it must have been submerged during the winter. It grows in tufts with filiform leaves, one or two inches long, which have their bases dilated, short and very broad, giving a bulbous appearance to the plant. Like *Selaginella*, it has spores of two kinds, the macrospores being at the base of the outer leaves, and the microspores at the base of the inner leaves. It is found only in the States named above.

DIATOM MOVEMENT.

The movement of living diatoms has always had a fascination for the microscopist, and numerous guesses have been made as to their method of locomotion. If living diatoms are placed on a slide under the microscope, they are seen to move gracefully backward and forward across the field of view, but always end-on, never sideways. Occasionally, a small piece of debris will be met with, and this will be pushed along in front of the diatom, but the microscope shows that the frustule is not in contact with the obstacle—there is a distinctly clear space between the diatom and the obstacle—showing that there exists an envelope of some substance around the diatom. Another proof of the existence of this envelope is the fact that it can be stained.

One suggestion as to the cause of the movement in diatoms was that it is caused by the streaming, or circulation of the protoplasm, and I have repeatedly watched a rapid, rhythmic movement along the raphe of the larger *Navicula* and of *Pluraxisigma*. It has been left, however, to Mr. A. A. C. Eliot Merlin, F.R.M.S., to solve the long-standing puzzle, and he has shown this movement is caused by a dense mass of extremely short plastic threads or cilia extruded through the well-known complicated structure of the siliceous valves, and placed in some unknown way, so as not to create an observable current in the surrounding water. Be this as it may, there is now no doubt whatever that the fact of the rapid vibration can be demonstrated, thus placing the movement of diatoms in the same category as that of other low forms of mobile water organisms, the propelling force of all being rapid plasmic vibrations of some kind.

Since announcing his discovery, Mr. Merlin has now succeeded in photographing the cilia of *Nitzschia sigmoides* by means of a 3 m.m. apo O.G. of 1.40 W.A., employed at a magnification of 1,300 diameters. The diatoms from which the photograph was obtained were skilfully stained so as to render the cilia visible on the mounted slide, by Dr. A. C. Coles, of Bournemouth.

The fine details of the photograph cannot be reproduced by the half-tone process, but it is hoped eventually to render it available for inspection by those interested.—J. SEARLE.

THROUGH THE VALLEY OF MYSTERY.

BY W. H. NICHOLLS.

Much has been written concerning most of the Grampians country, but nothing (as far as I know) has been published concerning the area now to be described. The trip was planned by Mr. J. B. Howie (Vermont), with the assistance of Mr. C. W. D'Alton (Hall's Gap). The other members of the party were Mr. F. J. Bishop and myself.

We left Hall's Gap on November 6th and travelled past Mackey's Peak, the western side. Our immediate destination, Turret Falls, was soon reached. After inspecting this pretty place, with its setting of showy Bauera (*B. sessiliflora*), which in places is 15 feet in height, we returned to the roadway, and to our packs, which weighed over 40 lbs. each. Our guide led us along the old timber tramway, which leaves the highway nearby. Travelling due south, we passed over the old Stony Creek diggings, and were soon admiring masses of the beautiful Swamp-heath, *Sprengelia incarnata*. The spikes of pink starry flowers were up to our shoulders, and a pure white variety was collected.

On the saddle between Mt. Rosea and Mt. Difficult Range, numerous flowers of *Euphrasia collina* were seen. It is a common plant in these wilds, and often grows luxuriantly. Our intrusion disturbed several Black Cockatoos, many Gang Gangs, and also a fine specimen of the Red Brush Kangaroo. This was supposed to be a botanical trip; but, the geographical features of the country traversed, proved so interesting, that at times, momentarily, flowers were forgotten. We kept at a steady pace, over the rises and through the valleys, but, halting often, to admire some unique floral display, such as Blue Tinsel Lily, *Calectasia cyanea*: its glorious blue was a conspicuous feature throughout, at least, three days of our wanderings. In one patch alone, we saw more than 350 flowers, in the space of 2 feet x 1 foot. The Purple Bladderwort, *Utricularia dichotoma*, was seen everywhere—on mossy ledges and rock faces.

We were now at the head of Mt. Rosea Creek, flowing east here, then onwards into the Glenelg River, thence to the ocean. On the saddle close by, and between the Serra and Mt. Difficult Range, *Boronia pilosa*, *Melaleuca squarrosa* and *Bauera sessiliflora* were intermingled in

the creek. Growing in profusion were the following plants:—*Pultenaea Benthamii*, *Calytrix Sullivani*, *Pultenaea Luehmannii*, *Leptospermum*, var. *grandifolium*, *Thryptomene calycina*, *Calytrix tetragona*, *Leptospermum myrsinoides* (with pink flowers), *Stypandra glauca*, *Cæsia parviflora*, and *Acacia Mitchellii*, also *Gymnoschoenus adestus*, and several species of orchids, including *Caleana major*.

We continued our journey, and on the banks of Mt. Rosea Creek and just below some high sandstone rocks—which we named "The Giant's Stepping Stones"—we found *Lhotskya* (Snow Myrtle) in some splendid bushes, and our first bush of *Pultenaea subalpina* (rosea), which, according to some botanists, grows on Mts. Rosea and William only. Ascending the rise before us, we found the Downy Star-bush, *Pleurandropsis phebaloides*, an unusually pretty plant, with its numerous yellow, star-like flowers and woolly tomentose foliage. On the crest of this hill Fringed Heath-Myrtle, *Micromyrtus ciliatus*, was plentiful, interspersed with a brownish moss, and covering a large open space, as is its wont. On the borders, *Calytrix* (Grampians Fringe-Myrtle), and *Thryptomene* (Heath-Myrtle) were in profusion; there was also plenty of *Leptospermum* (Manuka), which is also very numerous throughout the lower hills, and *Kunzea parviflora*, *Grevillea alpina*, *Dillwynia floribunda*, *Leucopogon virgatus* (unusually tall); and a solitary, very large bush of *Hakea pugioniformis* in bud. In the open spaces, grew the Purple Bladderwort.

The next few miles proved very heavy going. The scrub was old, and, in places, almost impenetrable. Creepers, mostly *Cassytha*, were interwoven among the lower branches, effectively delaying our progress. Reaching a creek, almost hidden by *Melaleuca squarrosa*, we rested. King fern, *Bauera*, and Mint-bush (*Prostanthera lasianthos*) were in luxurious growth on the levels all around—the *Bauera* predominating.

This stream (we called it "Melaleuca Creek"), flows probably into Mt. Rosea Creek. Beyond, we encountered tall growths of rushes, and found it tiring work pushing our way through them. We emerged at last, into comparatively easy country. By 6 p.m. we had reached another stream, probably Moora Moora Creek. Many fine large bushes of *Lhotskya* were flowering on its banks, together with *Thryptomene* and *Calytrix*. We found nearby, a strange, leafless shrub, *Leptomeria aphylla*,

known locally as "Wild Gooseberry." Here we camped.

Just over the neighbouring rise, to the south, emus could be heard, but we did not see any of the birds, though their favourite food, the fruit of the Flame-Heath, *Astroloma conostephioides*, was very plentiful hereabouts, and their tracks and other signs were not wanting.

Next day we were up by 5 a.m. Half-an-hour later, the sunrise was apparent by its reflection on the ranges to the west, and the immediate valley looked like an inland sea with innumerable islands. The dew had made our surroundings so wet that we were forced to delay our departure for several hours. When we did leave we had to keep to comparatively open spaces, where the undergrowth was low. At 9.30 a.m. we rested on an elevation, slightly east of south of Tower Hill, which was distant about a mile and a half. It is a conspicuous landmark, and the one remaining rampart of the northern extremity of a rocky wall.

Our position commanded views of the valley, in the foreground, and of Victoria Valley itself, beyond to the Black Ranges. Round about was a wonderful garden of Fringed Heath-Myrtle (*Micromyrtus*) with *Thryptomene* and *Calytrix* in abundance, and an occasional *Lhotskya* and Crimson Kunzea, *K. parviflora*. We travelled roughly south, through rocky country, with *Boronia pilosa*, 3 feet in height, and rested awhile at Small Creek, where *Bauera*, in riotous profusion, grew up to 8 feet in height.

By 1 p.m. we found ourselves at a fairly wide rocky creek, with a good flow of water. We had negotiated a succession of dangerous rocky ledges, between steep banks, where the scrub was very dense. Our packs were troublesome; and often one was held suspended.

We called this stream "Discovery Creek," as we found on its banks very large bushes of *Pultenaea subalpina* (*rosea*), also two orchids new for the Grampians, one a rare species, being new for S.W. Victoria. One splendid bush of *Pultenaea* (*rosea*) was in full glory: its base, a tangle of showy *Bauera*. This bush was measured, and found to be 11 feet 6 inches in height and 16 feet across. Below, in a backwash of the stream the surface was rosy red, with the fallen confetti of both *P. subalpina* and *Bauera*.

Leaving this creek, we had another rough passage through more heavy scrub, and finally emerged upon the

lower ridges, below Middleton's Gap. From a prominent vantage point a little higher up, another glorious view was obtained of the immediate valley, with Tower Hill at the northern extremity to the west, on a rocky rampart. Huge figures, of almost the total height of the wall, could be clearly seen (with field glasses), reminding one of the statues of Abu-simbel on the Nile. And above, over the Gap, several Wedge-tail Eagles were soaring. Around us, on all sides, above the intermingled growth of Grampians shrubs were gigantic masses of sandstone of almost every conceivable shape, from mushroom rocks to wonderful statues. The rocky character of this ridge, combined with the tall dense growth of *Melaleuca squarrosa*, etc., caused us much trouble and frequent rests were imperative. On the opposite ridge, and beyond towards D'Alton Peaks, we saw *Pultenaea* (*rosea*) in such profusion that large patches were visible to the naked eye at a distance of over half-a-mile. We explored these ridges next morning. Many other well-known plants were in blossom around, including *Calcectasia cyanea*, *Boronia pilosa* and *Euphrasia collina*, the two last unusually fine.

We now descended to the creek, hoping to find an easier passage to the Gap, but encountered such dense scrub (*Melaleuca* and *Dagger Hakea*) that we had to retrace our steps, breaking through higher up, and finally reaching the head of the creek and Middleton's Gap.

On the way I found our first specimens of the Alpine *Caladenia*, *Caladenia alpina*, Rogers. It has only recently been described, and this discovery adds yet another species to the list of plants for S.W. Victoria. Our guide also found here a species of orchid, new for the Grampians, *Chilodactylis Gunnii*, both green and purple forms in abundance. In the Gap we were surprised to find more bushes of *Pultenaea* (*rosea*). They were all in perfect condition, and Heath (*Epacris impressa*), with unusually large flowers, var. *grandiflora*, of such colours as pink, magenta, rose, and scarlet and white. We camped here under a huge mass of rock, of mushroom shape, in a slight depression, an ideal spot, away from the cool draught, blowing from the valley below.

Next morning we awoke. The huge log fire at our feet still gave out welcome warmth, and not a sound disturbed the silence until—"The bell-note of a bird" revealed the presence a Grey Thrush. We saw it later.

when viewing the prospect from the Gap. We looked s. east, over Borough Huts to the Mt. William Range and in the opposite direction to the Western Valleys. The compact and shapely bushes of *Pultenaea* (*rosea*) and masses of lovely *Tetratheca* (*T. ciliata*) on the ridges close by were next examined, both inflorescences showing large unbroken masses of colour in some instances.

Caladenia alpina and the Blue Turquoise Berry *Drymophila cyanocarpa* were plentiful, and specimens of both were collected, the former being photographed in its habitat for the first time. Several Funereal Cockatoos flew over the camp on a visit to the Honeysuckle flats to the East, from whence we saw them returning at noon, to the seclusion of the hills.

The morning was spent in this wonder garden. Among the rushes and grass, Violets were abundant—three species (*Viola betonicifolia*, *hederacea* and *Sieberiana*), and Buttercups (*Ranunculus lappaceus*) of large size. The peaks of the Serra Range, to the southward, were examined during the afternoon. On a high eminence, under a curious verandah-rock, of huge proportions, we viewed the country below; north to Sundial Peak, etc., with Lake Lonsdale and Lake Eyan's beyond. *Pultenaea* (*rosea*), *Thryptomene* and *Micromyrtus* were here, within a few yards of the summit, and many shapely trees of the Grampian's Gum, *Eucalyptus alpina*, added beauty to the scene.

Farther south we scaled another prominent point—the highest elevation for miles around, its apex a tower-like formation of sandstone—with rock-seats and pools of water! for our comfort. Its base and the immediate foreground of quite cheerful appearance, with the flowers of *Pultenaea* (*rosea*) and other plants. We named it "Pultenaea Point." From its summit the Borough Huts were seen, due east (on the Tourist Map they are placed farther N.E. app. 1½ miles). Our elevation was about 3,500 ft.

We explored, botanically, the country—slightly to the west, and found another species new for S.W. Victoria, viz., Purple Apple-berry, *Billardiera longiflora*. It was rather plentiful among the rocks, its gorgeous fruit of large size. Other plants collected included *Styphelia adscendens*, *Tetratheca ciliata*, *Banksia integrifolia* (trees of large size), *Correa Laurenciana*, *Correa rubra*, with very large rough surfaced leaves, flowers lemon, fore part blue-black, should be given a varietal name,

Templetonia Muelleri, *Melaleuca decussata*, *Eutaxia empetrifolia*, *Leucopogon glacialis* (the last mentioned flowering very late), also several orchids, including *Caladenia alpina* (plentiful), *Caladenia iridescens* (one spm.), and *Chiloglottis Gunnii*.

On November 9th we left the Gap, travelling down Discovery Creek, thence south through the thick scrub and wild flower gardens to Middleton's Mount. On the way we collected *Banksia marginata*, *Hakea sericea*, *Phelipium dentatum*, *Boronia polygalifolia*, and *Epacris impressa* (of various colours--plants up to 7 feet). From here we surveyed the valleys to the west, with Castle Rock in the foreground, *due west* (Tourist Map shows it *north-west* over Discovery Creek!). Thence we descended to a creek, a valley of wondrous rock formations of huge size.

This creek of crystal water was named "Alpina Creek," as on its banks we found *Caladenia alpina* in plenty, and specimens even larger than those seen previously--the petals, etc., tipped with rose. Showy *Bauera* was also plentiful, and a pink form with yellow stamens was collected.

Returning the way we had come, we descended the precipitous side of the Serra Range to Borough Huts and Hall's Gap, observing on the way plenty of *Stackhousia flava*, another species, not recorded, in the "Census" for the S. West.

CLUB'S NEW BADGE.

The new badge, designed by Mr. H. Dickens, is now obtainable, in three forms: brooch, pendant, and stud for coat lapel. The Red Correa replaces the sea shell that for so many years has been our badge. The change has met with general approval, and already numbers of Correa badges have been distributed to members. The price is 2/6.

At Wandin, on October 15th, 1927, while observing a pair of White-eared Honeyeaters, *Meliphaga leucotis*, I seated myself about a yard from the nest, which was built in low scrub about 2 feet from the ground, and contained two young. The parent birds were alarmed, and tried to lure me away by fluttering along as though injured. Presently they became more reassured, and began to hunt for insects. After many advances and retreats, the mother bird at last flew to the nest, and fed the young. The male bird continued to capture insects. He would perch on a branch about 10 feet away until his mate returned to him, when the food was given to her and she flew with it to the nest. This performance was repeated several times, the male not approaching the nest during the half-hour while I remained there.—PEARL HANKE

THE WILDFLOWER SHOW.

One of the most successful Wildflower Shows ever organised by the Club, was held in the St. Kilda Town Hall on September 27th last.

It was officially opened by His Excellency the Governor, Lord Somers, accompanied by Lady Somers. The Chief Secretary, Hon. G. M. Prendergast, M.L.A., was also present. Lady Somers was presented with a lovely basket and bouquet by Donald Barrett. The floral presentation was designed by Mrs. F. G. Sutherland.

The front table was arranged by the students of the Burnley Horticultural Gardens. A portion of the exhibit was from cultivated plants, the balance being collected by the students at Ringwood. The display was a very fine one, some excellent sprays of *Eucalyptus torquata* and *Grevillea rosmarinifolia* being staged.

The main hall was a mass of glorious wildflowers. Mr. H. B. Williamson, F.L.S., placed a named collection of over 200 species on the botanical classification table.

Miss Jean Galbraith's collection deserves special mention. It was staged on a stand designed and provided by Miss Galbraith, who displayed a splendid collection of flowers from Tyers, Gippsland. There were over 120 species, prominent among which were some wonderful bowls of the Club's Badge Flower, *Correa rubra*.

The Grampians display was rather a poor one, and most of the display of *Thryptomene calycina* was from cultivated plants. Owing to a misunderstanding, the Grampians display did not reach Melbourne until the day after the Show.

The Club suffered another disappointment in the absence of flowers from New South Wales. Thus Waratahs, Flannel Flowers and the Sydney Rose *Boronia* were all absent from the Show, owing to the restrictions imposed by the New South Wales Wildflower Protection Act. Still, the sales sections, in the hands of several members of the Ladies' Committee, were very popular, and brought in a good return.

The abundance of displays of the Red-flowered *Correa*, sent from several localities in Gippsland, was an evidence of the splendid season for flowers in that division of the State. Some fine bunches came from Miss Rossiter, of Hedley, and Miss Jean Galbraith, of Tyers.

As usual, Miss Amy Fuller's collection of wildflower paintings attracted considerable notice, and the micro-

scopes, in charge of Mr. Stickland, were a valuable adjunct to the Show.

Everybody worked with enthusiasm, and it is to this unanimity of action that the success of the Show is due.

EXCURSION TO WEST KINGLAKE.

Though rain fell during the early part of the day, ten members ventured from home on Cup Day, and at West Kinglake enjoyed one of the pleasantest outings of the season. The mists rolled away, and the weather became beautifully fine.

From Whittlesea, a motor-run of nine miles brought the party to "Tommy's Hut," original name of the settlement at the intersection of the Kinglake and Yea roads, and another mile along the Kinglake road set us at the tram-line that runs down to the saw-mill, the scene of Mason's Falls.

Collecting was commenced during the pleasant walk through the virgin underscrub, where progress would have been difficult off the track, and the final descent "down the stairs" of the timber trolley way brought us to the old mill, so completely burnt out by the bush fires of January, 1926. The leader took the opportunity of pointing out the wonderful nectar sacs found at the base of the petals of some of the *Ranunculus* family, as in *R. rivularis*, and by means of a flower showed their positions, which materially helped his remarks on the places, functions, and purposes of the glands in plant life.

The two upper falls, near at hand, were viewed and further exploration down Mason's Falls Creek, that joins the Sugar Loaf Creek later, revealed a series of other falls; then the creek was found to turn from a southern to that of a westerly trend, past a frowning gorge, where exploration terminated. *Pomaderris elachophylla* was found, and *Senecio laetus* with *Helichrysum lucidum* and much *H. semipapposum*, also *Pultenaea Muelleri* and *P. scabra* gloriously in flower, and exceptionally large-headed specimens of *Olearia myrsinoides*. After listening to the clucking call of a Lyre-bird, and the whistling of Thrushes, Kookaburras, etc., the party divided. Four orchids only of different species were found, and 14 species of ferns were seen, of which the Fan Fern, *Gleichenia flabellata*, known to some as the Star Fern, interested many.

But perhaps the showiest and most pleasing to a number was the *Banksia ramorum*, in light and dark shades, growing in abundance and reminding at least one member of his happy hunting grounds in the Bendigo district. Altogether 110 species of native, and 20 species of introduced plants were collected or noted.

As we turned for home and our motor-car, the party climbed up the 300 and more steps of the long ladder-like tram line, rising out of the sawmill valley, towards Kinglake road, the exertion causing us to think sympathetically of the pilgrims to the famous Chinese temple of the 2,000 steps, that needed to be trod if they would get "nearer to heaven" in the worship their priests enjoined.

Handsomely coloured pendant flowering specimens of *Pimelea linifolia* were seen, reminding the party that the *Daphne* of our gardens, belonged to the same family as the *Pimelea*—A. J. TADGELL.

The Victorian Naturalist

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JANUARY 7, 1928.

No. 529.

THE FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall, Victoria-street, Melbourne, on Monday, December 12th, 1927. The President, Mr. E. E. Pescott, F.L.S., occupied the chair, and there were about 120 members and friends present.

DEATH OF MEMBER.

The President referred to the recent death of a valued member of the Club, Mr. R. E. Luher, B.A., and members stood in silence as a mark of respect.

CORRESPONDENCE.

From Minister for Forests, stating that only fifty per cent. of the area in the Upper Yarra-district, in which it was proposed to allow sawmilling operations, was above the catchment for water supply purposes, and that he considered that the utilization of our timber resources and water supply could go hand in hand.

From Minister for Lands, stating that he was awaiting a reply from the Committee of Management in regard to the proposed use of the Cheltenham Water Reserve as a golf links.

REPORTS.

Reports of excursions were given as follow:—Loch to Nyora, Mr. H. B. Williamson, F.L.S.; Boronia, Mr. F. E. Wilson, F.E.S.; Botanic Gardens, Mr. J. Wilcox; Wandin, Mr. H. B. Williamson, F.L.S.

ELECTION OF MEMBERS.

The following were elected as ordinary members:—Mr. W. Harper Bell, 55 Collins-street, Melbourne; Mr. R. H. Croll, Education Department, Melbourne; Mr. W. H. Gill, 100 Exhibition-street, Melbourne; Mr. H. B. Gooby, Helton-street, Glenroy; Dr. Sydney Pern, 12 Collins-street, Melbourne; Mrs. A. S. Kenyon and Miss J. A. Kenyon, Plenty-road, Heidelberg; Mr. H. J. Wright, Box 1187, G.P.O., Melbourne; Miss F. M. Woodfield, 73 Hot-ham-street, East Melbourne; Miss E. M. Sweatman, Westbury-street, St. Kilda; Mrs. D. J. Byrne, Clarinda-street, Caulfield; Miss A. Hodgins, Hawden-street, Heidelberg; Mr. A. H. Spencer, 86 Bourke-street East, Melbourne; Miss I. J. Bainbridge, University Grounds, Carlton; and Miss E. Hooke 33 John-street, Hawthorn;

and as country members:—Mr. Geo. Aiston, Mulka, via Maree, South Australia; and Mr. Harold Smith, Horsham.

GENERAL.

The President reported having visited Cape Woolamai with representatives of other Societies, and stated that, unless prompt action was taken, the Mutton-bird rookeries would be entirely destroyed by drifting sand in a few years. He also referred to the opening of a fund, to which the "Herald" had contributed £25, with the object of purchasing private land on which the rookeries were situated, and expressed the hope that other donations would be received.

Notice of motion was given, on behalf of the Committee, as follows:—"That Mrs. V. Miller be elected an Honorary Life Member, in recognition of the special services and benefactions rendered to the Club by both Mr. and Mrs. Miller during the past two or three years."

PAPERS, ETC.

Mr. A. D. Hardy referred to the recent introduction of four English Nightingales into New Zealand. He outlined the history of the introduction of the Skylark and Nightingale, and the subsequent observation of their life in Australia, and followed his remarks with an interesting selection of gramophone records of the Nightingale's song.

A lecture was delivered by Rev. W. C. Tippet on "A Visit to Fiji," in the course of which the lecturer gave an interesting account of the life and customs of the natives, and a description of the principal plants to be found on the islands. A fine series of lantern views was exhibited in illustration of the subject.

EXHIBITS.

By Mr. A. S. Kenyon.—Collection of Fijian weapons, tools, and utensils.

By Rev. W. C. Tippet.—Specimen of native cloth from Fiji.

By Mr. C. Daley.—Stone axes from Suva, Fiji.

By Mr. E. E. Pescott.—Cultivated specimens of Victorian Christmas-bush, *Prostanthera lasianthos*, New South Wales Christmas-bush, *Ceratopetalum gummi-ferum*, and *Hibiscus Huegelii*.

By Mr. F. G. A. Barnard.—Growing plant of Myrtle Beech, *Nothofagus Cunninghamii*, obtained as a seedling about 4 inches high on Marysville excursion, December, 1918.

By Mr. F. Pitcher.—Flowers of Erect Clematis, *C. glycinoides*, grown in cultivation; also specimens of Necklace Fern, *Asplenium flabellifolium*, collected at Kalimna, 11/11/1927.

By Mr. P. R. H. St. John.—(1) Plant of Hard Saw-Fern, *Asplenium scleroprium*, Homb. and Jacq., 1852—syn. *A. flaccidum*, var. *aucklandicum*, Hook. fil. 1844, syn. *A. lucidum*, var. *scleroprium*, Moore, 1857, found at Biddy's Camp, Wilson's Promontory, November, 1927. (Recorded in *Flora of New Zealand*, second edition, 1925. From Stewart Island, Herekopere Island, and Auckland Islands. Abundant on the margins of woods near the sea.) (2) Herbarium specimen of Creeping Rock Fern, *Cheilanthes Sieberi*, Kunze, 1839. (Australia, New Zealand and New Caledonia), collected by exhibitor at Beveridge, Vic., November 13th, 1927. (3) Herbarium specimen of Rock-Fern, *Cheilanthes tenuifolia* (Burm.) Swartz, for comparison with *Cheilanthes Sieberi*.

By Dr. H. Flecker.—Large moth, strangled by tendril of grape-vine.

By Mr. E. S. Hanks.—Collection of birds' nests from Wandin.

By Mr. H. P. Dickens.—Mutton-bird eggers' crook, from Cape Woolamai.

By Dr. C. S. Sutton.—Series of photographs of flora, etc., of Table Mountain district of Tasmania, taken by Mr. Weindorfer.

The meeting terminated after the usual conversazione.

EXCURSION TO WANDIN.

A few members took part in the excursion to Wandin on Saturday, December 10th. Some scrub near the railway station was searched, and a few plants were found in bloom, including the Common Fringe-lily, *Thysanotus*, Austral Centaury, *Erythraea*, and Pale Grass-lily, *Caesia*. Then a drive along the road towards Yarra Junction was undertaken through the courtesy of Mr. Lyle, and several places were visited, including a grazing paddock at Woori Yallock, where the vegetation consisted almost entirely of shrubs of Manuka and Burgan, the latter in bloom, the former infested with a black fungus. Here Miss Lyle took a number of insects, including cocoons of a case moth, some of which were clothed partly with Manuka leaves and partly with gum leaves, indicating probably that the larvae had lived for a time on both plants.

Brown Admirals were noted in numbers, but the most interesting object seen during the day was a butterfly resembling that common species, but larger, and presenting when resting a remarkable resemblance to a brown dead leaf resting on edge, and, of course, very difficult to locate. The creature eluded capture.

The insects taken at Wandin included some saw-fly larvae. Butcher birds were among the few birds noted.—H. B. WILLIAMSON.

THE AQUATIC PLANTS OF VICTORIA.

Part I.

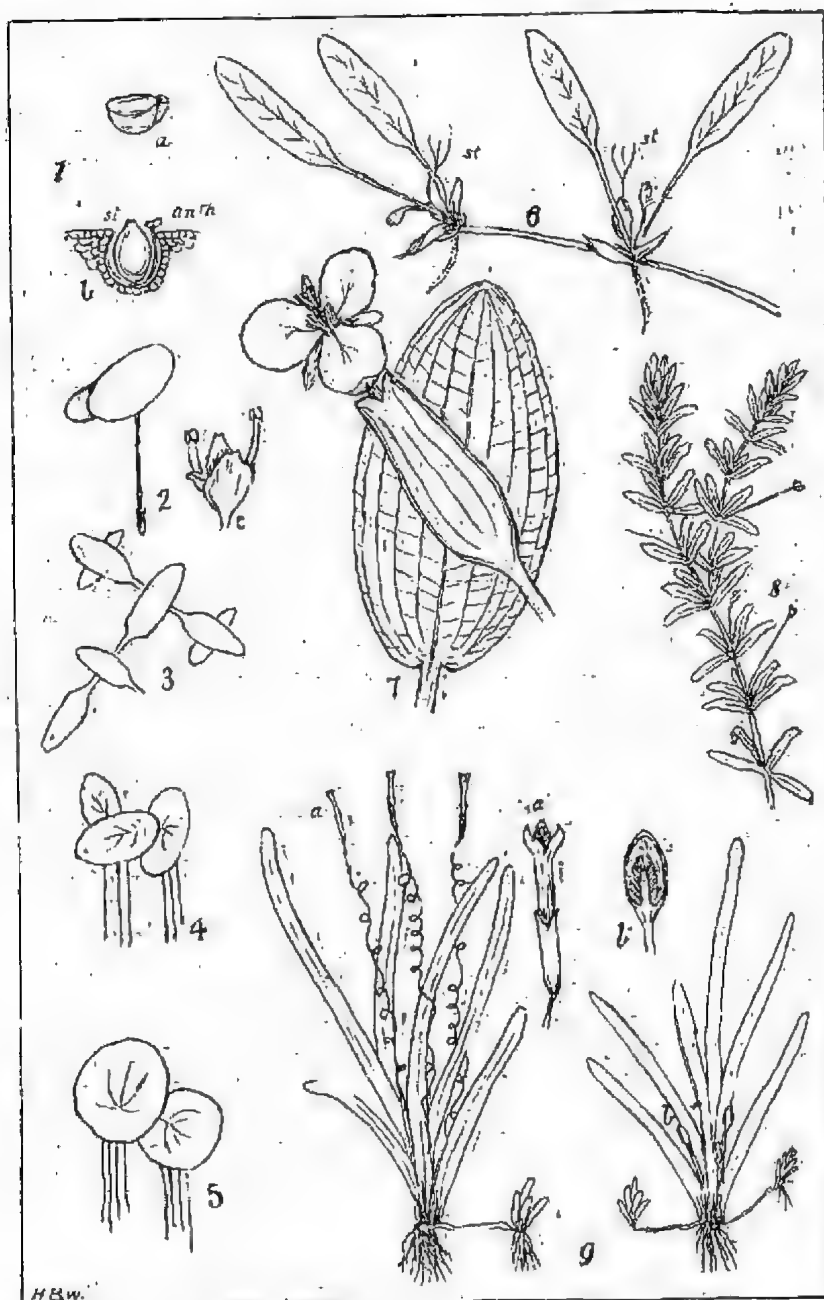
By H. B. WILLIAMSON, F.L.S.

In these articles it is proposed to give an account of the monocotyledonous flowering aquatic and marsh plants of our State, as far as can be now outlined, for it must be admitted that there is still much research to be done in this direction. Several species have rarely or ever been collected in the State since Baron von Mueller took them during his excursions into the botanically unknown regions over 70 years ago. The Baron, in his later years, was always expressing the hope that collectors would give more attention to the water plants, and the need for such field work has by no means diminished, seeing that our fields for the study of aquatic flora are suffering the general spoliation consequent on the extension of settlement.

In prosecuting such field work it is, of course, necessary that collectors should be provided with certain equipment usually unheard of at botanical excursions. A boat, even if only a flat box affair, is of course the most useful, but one cannot carry that about. Gum boots would be an ideal equipment for the gathering of the plants in shallow water, but an essential part of the outfit is a jointed rod fitted with a net or wire basket with hooks. Failing this, a very effective and portable appliance is a small wire basket with hooks round the edge, which can be thrown among the vegetation, and hauled in by a strong cord. By attaching a small muslin net to the basket, one could entrap such small plants as *Lemna* and *Wollfia*. The hooks would tear out such plants as grow in masses, e.g., *Potamogeton* and *Hydrilla*. Any such hauls taken by a collector could be sent to the National Herbarium, South Yarra, where it would be determined for the sender, and preserved as a record under his name.

Family LEMNACEAE, Duckweeds.

The plants of this family are among the most minute of flowering plants, and are truly aquatic. They vary from one-thirtieth to one-half inch in length, and are either rootless or produce capillary unbranched roots extending into the water, which are covered at the end by a cylindrical cap. Rootcaps are seen on most roots, but as in the case of duck weeds, the cap is in contact with water, only it is preserved uninjured, and can be observed in its entirety. The simple frond-like body of



1 to 5, *Lemnaceae*. 6 to 9, *Hydrocharitaceae*.

the plant floats on the surface of water, and produces by budding other fronds, which separate into independent plants, and thus the surface of the water becomes covered with a carpet of green. The Victorian Duckweeds are classified into three genera:—*Wollfia*, with fronds rootless; *Lemna*, with a single root to each frond; *Spirodela*, with several or many roots to each frond.

Genus WOLLFIA.

WOLLFIA ARRHIZA, (L.) Wimm. Tiny Duckweed. Fig. 1. This Duckweed, which is found in many parts of the world, is the smallest known flowering plant, and consists of fronds composed of cellular tissue only, and is quite unprovided with roots. It varies from one-fiftieth to one-sixteenth of an inch in length, and is about half as broad as long. Its thickness is even more than its breadth, so that one might almost mistake it for a small green seed. The figure (a) shows a bud forming at the side. The flower, which has probably not been observed in Australia, consists of a minute stamen on the upper surface side by side with an equally small stigma (b), both developed at the bottom of a cavity. It occurs in Europe and Asia, and has been noted in S.A. and N.S.W.

Genus LEMNA.

LEMNA MINOR, L. Common Duckweed. Fig. 2. The frond is broadly ovate, about one-sixth inch long, and convex above and below. This is the species most often found, but flowers are rarely seen. They occur in a small crack on the edge of the frond, and are very simple, as the figure (c) shows, and scarcely visible without a lens. It occurs in all States, and in every part of the world.

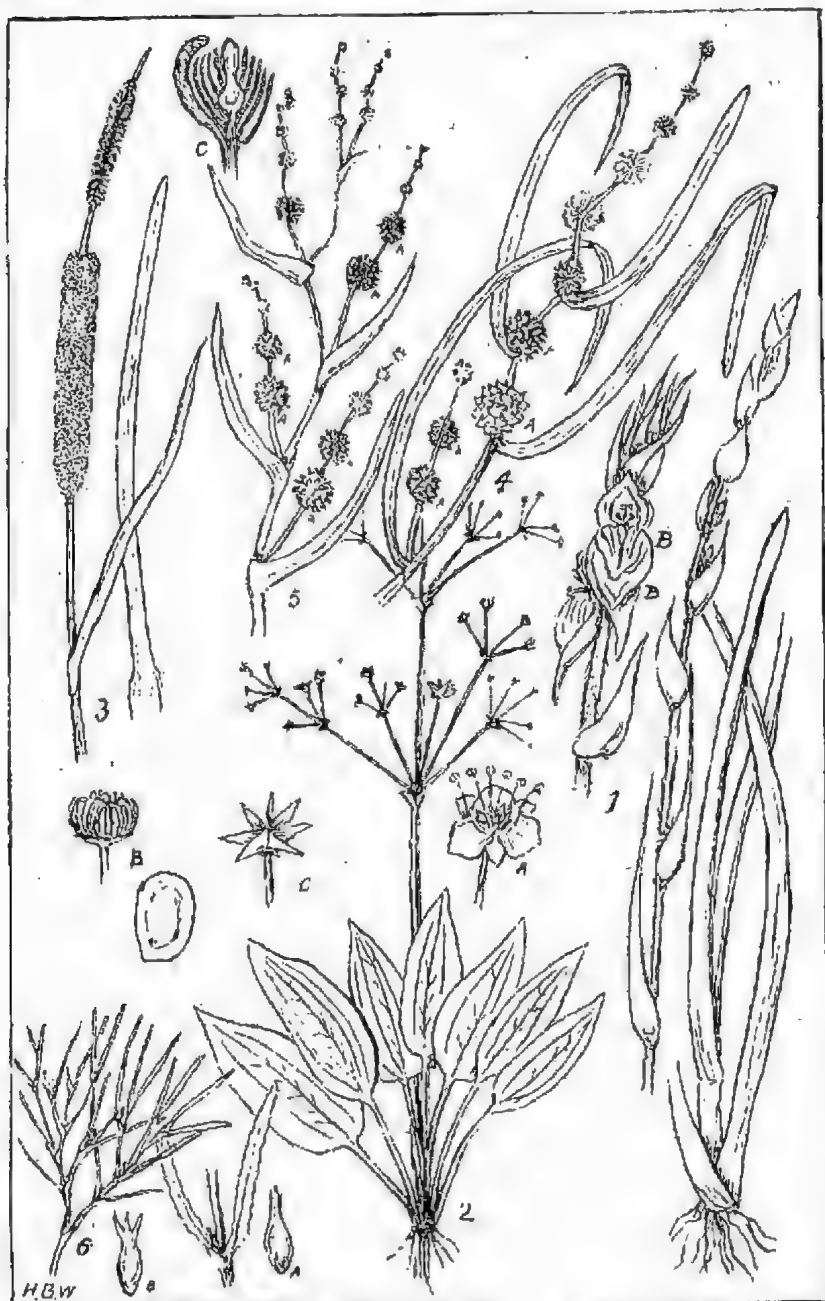
LEMNA TRISULCA, L. Ivy Duckweed. Fig. 3. Fronds thin, almost lanceolate, and provided with a stalk, reminding one of little green spades nearly half an inch long, including the stalk. Young fronds grow out at right angles, four or five being sometimes joined together. Roots are very short, with a rather long root cap.

All States except W.A.; also in Europe, Asia, Africa and America.

Genus SPIRODELA.

Differs from *Lemna* in having more than one root to each frond.

SPIRODELA OLIGORRHIZA (Kurz) Hegelm. Fig. 4. Thin Duckweed. Identical in shape and size with *L.*



1, *Philodraceae*. 2, *Alismataceae*. 3, *Typhaceae*.
4-5, *Sparganiaceae*. 6, *Najadaceae*.

minor, but with fronds rather thinner, three- or four-nerved and provided with 2 to 5, sometimes more roots to each frond. All States but W.A. and Tas.; Polynesia and Asia.

SPIRODELA POLYRRHIZA, (L.) Schleid. Fig. 5. Large Duckweed. This is easily distinguished from the preceding by its large, almost orbicular fronds about $\frac{1}{4}$ inch in diameter, light green above, and purplish below, provided with several, often many root fibres. Apparently it has not been collected in Victoria since Mueller got it on "Lagoons on the Towong, 1874," N.E. Vic. It occurs in N.S.W. and in Europe, Asia, Africa and America.

Family HYDROCHARITACEAE.

This family of submerged plants is represented in Victoria by four species each of which belongs to a different genus.

HALOPHILA, a submarine plant with unisexual flowers.

OTTELIA, with large bisexual flowers and large floating leaves.

HYDRILLA, with small verticillate leaves and unisexual flowers.

VALLISNERIA, with long narrow leaves and female flowers growing on long spiral stalks.

The family belongs to the class of Monocotyledons, which have an inferior ovary (set below the perianth), and is distinguished from the other families of the class (*Orchidaceae*, *Iridaceae* and *Amaryllidaceae*) in being aquatic plants with regular flowers, mostly unisexual, and with no albumen in the seed.

Genus HALOPHILA.

HALOPHILA OVALIS (R.Br.), Hook.f. Sea-wrack. Fig. 6. A submarine plant with thin, finely veined leaves, and stems rooting at the nodes, where leaves arise in pairs. Flowers are unisexual, and are contained in a two-leaved spathe. Male flowers are stalked and emerge from the spathe. Female flowers are sessile, and are included in the spathe. The ovary has on its summit three long hair-like stigmas. (st.). "Common on the shores of the Indian and Pacific Oceans, often above low water mark at the mouths of large rivers or brought up from depths of seven fathoms or more." The author obtained it at a depth of 10 feet while diving in the Geelong baths. All States but W.A.; also Asia.

Genus OTTELIA.

OTTELIA OVALIFOLIA (R.Br.), Rich. Swamp Lily. Fig. 7. A common plant in shallow ponds, with ovate or oblong leaves on long stalks, allowing the blades to float on the surface. The large white flowers arise from a two-lobed, tubular, ribbed spathe about $1\frac{1}{2}$ inches long. Petals 3, sepals 3, stamens 8 to 12, stigmas 6 to 8. All States except Tas. It is confined to Australia.

Genus HYDRILLA.

HYDRILLA VERTICILLATA (L.), Casp. Water-thyme. (Elodea). Fig. 8. A much branched fresh water plant often forming large masses under the surface. The leaves are about $\frac{1}{2}$ inch in length, in whorls of from 4 to 8, broad linear, finely toothed. Flowers are small, long stalked, with petals and sepals 3. The only Victorian specimens are Mueller's "in fluvia Murray," whether N.W. or N.E. is doubtful. It is found in the rivers of Northern Australia, S.A., and N.S.W.; also in Asia and Africa.

Vallisneria spiralis, L. Eel-grass. Fig. 9. Stems creeping by stolons at the bottom of ponds and rivers. The leaves are long, and ribbon-like, often finely toothed at the end. Male flowers (a) are produced on short stalks on separate plants, having 2 or 3 stamens, and 3 sepals. Female plants (b) bear flowers on long, spirally, coiled, thread-like stalks. Fertilization is effected by the pollen escaping from the male flowers, rising to the surface, and coming in contact with the stigmas of the female flowers, which just reach the surface, the coiled peduncle allowing for a considerable change in the depth of the water. All States but W.A.; Europe, Asia, Africa and America.

Family PHILYDRACEAE.

Allied to *Alismataceae* and *Liliaceae* in having a superior (set above the perianth) ovary, but having only 2 petals, 2 sepals, and 1 perfect stamen.

Genus PHILYDRUM.

PHILYDRUM LANUGINOSUM, Banks. Woolly Water-lily. Fig. 1. A swamp plant about 2 feet in height, scarcely branched, clothed with a woolly tomentum, especially on the inflorescence, wearing off with age. Leaves 6 inches to over a foot in length, distichous, sheathing, gradually passing into short sheathing bracts at the inflorescence. (Flowers (b) sessile, solitary, or rarely two within each broad, pointed bract.) Petals 2 (upper and

lower) yellow, about $\frac{1}{2}$ inch in length; Sepals, 2, longer than the petals, yellow. It has apparently been gathered only twice in Victoria:—Upper part of Wimmera (Grampians?), Wilhelmi; Swamp near Bairnsdale, T. S. Hart. N.S.W. and Qld.; Asia.

Family ALISMATACEAE.

Allied to *Liliaceae*, but with fruit consisting of distinct fruitlets.

Genus ALISMA.

Fruit with numerous roundish one-seeded carpels.

ALISMA PLANTAGO, L. Water Plantain. Fig. 2, partly. A semi-aquatic, erect plant, with leaves all basal, ovate lanceolate, sometimes cordate at the base, usually seven nerved, on long stalks, their bases thickened into a thick rootstock. Inflorescence a large panicle of whorled branches, one to three feet in height. Flowers (a) small, pale pink, sepals and petals 3, stamens usually 6. Carpels (b) 15 to 20, obovate, flattened, rounded on the back and above, closely packed in a ring round the axis. S.A., V., N.S.W., Europe, Africa, Asia, America.

Genus DAMASONIUM.

Carpels 6 to 9, tapering to a point, radiating, two-seeded.

DAMASONIUM MINUS (R.Br.), Buch. Star-fruit. Fig. 2. A plant with a remarkable resemblance to the preceding in habit, foliage, inflorescence and flowers (a), but it is smaller, 6 inches to a foot in height, and its leaves have fewer veins—3 to 5. It is, however, easily distinguished by its peculiar star-shaped mass of carpels (c), which are triangular, long-pointed and connate by their broad bases. All States but Tas. It appears to be confined to Australia.

Family TYPHACEAE.

Flowers without perianth, which is replaced by capillary bracts on the short flower stalks. Flowers in dense spikes.

Genus TYPHA.

TYPHA ANGUSTIFOLIA, L. Bulrush. Fig. 3. A tall, reed-like plant, growing round the edge of swamps or ponds. Leaves long and rigid, about $\frac{1}{2}$ inch wide. Female flowers (c) are densely packed in a cylindrical spike (a) about $\frac{3}{4}$ inch in diameter and 9 inches long, crowded among the soft hairs (bracts). Male flowers are in smaller spikes (b), about 1 inch higher on the

stem. The hairs of the fruiting spikes provide a material resembling kapok, which can be used for the same purposes. All parts of the world, and all States of Australia.

Family SPARGANIACEAE.

Differs from the preceding in having flowers in globular heads, having scales instead of hairs between the flowers.

Genus SPARGANIUM.

SPARGANIUM ANTIPODUM, Graebner. Ribbonry Bur-reed. Fig. 4. A plant with leaves long, narrow rather thick, almost triquetrous, floating or submerged. Heads of female flowers (a) 2 to 4, sessile. Heads of male flowers (b) on thin, flexuose simple branches.

Murray River, near Towong; Omeo; Yarra. Mueller.

SPARGANIUM RAMOSUM, Hudson. Erect Bur-reed. Fig. 5. An erect (1 to 3 feet), more robust plant, with amply branching inflorescence, and with leaves never floating. Only two localities in Victoria for this plant are recorded:—Merri River, Warrnambool, H.B.W., 1902. Emu Creek, Mueller. It occurs also in N.S.W. and Qld., as well as in all other continents.

It is hoped that collectors will give some attention to the marshy places, where these Bur-reeds may be found.

Family NAJADACEAE.

Allied to *Potamogetonaceae*, but with toothed leaves and a different inflorescence.

Genus NAJAS.

NAJAS TENUIFOLIA, R.Br. Water Nymph. Fig. 6. This wholly submerged plant, which may be mistaken for *Althenia*, *Ruppia*, or a fine leaved *Potamogeton*, has narrow-linear leaves finely toothed, about an inch long, which are provided with short broad sheaths, partly clasping the stem. Flowers are minute, sessile in the axils, male or female, the males (a) having a single anther, and the females (b) a bifid stigma. Lagoons on the Murray River; very rarely gathered. S.A., N.S.W., Qld., New Caledonia.

ERRATA.—*Naturalist*, December, 1927.—Page 207, line 10, delete the C. before Searle; line 12, *Lipiduris* should read *Lepiduris*. P. 228, line 32, *Plurasigma* should read *Plaurosigma*; line 46, 1.40 W.A. should read 1.40 N.A.

HISTORY OF FLORA AUSTRALIENSIS.

Part VII.

BY CHAS. DALEY, B.A., F.L.S.

From Cambridge, where Dr. Hooker is holding an examination in Natural Science, he writes on December 10th, 1869:—"Dr. Rees called on me I introduced him to his fellow-voyager, the *Todea*, which he tells me had a cabin to itself during the voyage. This no doubt accounts for its excellent condition, for, indeed, the hold is destruction to live plants." He will send *Sanacencias* again, and *Nepenthes* also, if required. Instead of parcels of seeds which were spoiled in transit, he suggests establishing young plants and sending them potted in Ward's cases by private hands.

On December 8th, 1869, he advises the despatch of *Veratrum album* and *V. viride*. "We shall pack the *album* and the *viride*, if strong enough, in a little damp moss, and send it overland in a box with holes bored in the side. The roots seem to be a sort that should travel after this fashion."

"Many a case is brought safe to Suez or Alexandria and destroyed on the passage home to England."

March 25th, 1870, Dr. Hooker asks for plants, and is sending seeds and plants. "More big *Todeas* will be acceptable—it is growing famously. How are *Nepenthes* and *Sanacencia*?"

The correspondence shows some of the difficulties in the way for safe transfer of seeds and plants from the one hemisphere to the other, and the means of preserving them alive.

On May 14th, having received some *Epacris* seeds, he asks for those of *Epacris*, *Rutaceae*, *Bauera*, *Goodenia*, and the smaller legumes. In November he announces that the plants sent in calico are all dead. *Loranthus* seeds are always destroyed before reaching England. He has forwarded cuttings of plants, and affirms his predilection for *Todeas*. "I would readily pay £10 towards expenses of a couple of good ones."

On April 4th, 1871, from the P. and O. steamship, "Majestic," he writes, when *en route* for a holiday at Tangier *via* Gibraltar. Adverting to the loss of plants sent in canvas, he attributes it to the want of moisture in the tropics under the canvas.

At this period Mueller's troubles in the Directorship and the future working of the Botanical Gardens were

rather acute. Dr. Hooker expresses his sorrow at hearing the news.

"I know from experience how difficult it is to secure and hold always the position which one would like to occupy, but these things are of the ups and downs of life. . . . No doubt had one turned one's energies or one's talents in other directions, we should have made more of them, but then we should not have been so happy and contented with ourselves."

He is glad that Mueller is doing the flora of Lord Howe Island. "I am sure that we still have duplicates of American plants that would be useful to you, but the time to select them is what we want. How I wish that you could come over here, and take your pick."

After a temporary lull in the agitation to effect changes in the Melbourne Botanical Gardens, Hooker writes on December 1st, 1871:—

"Let me congratulate you heartily on your release from the worries and anxieties of your anomalous position, and next in the acceptance of your dignities, which, although not acknowledged by the laws of this country, must be very gratifying to you as testimonies of the appreciation of your countrymen that are seldom awarded to aliens. I am not at all up in these matters, and scientific men in this country are not fond of letters and orders except when given for direct service to the State we serve."

The dignity referred to was the conferring of the title of Baron.

Writing on 20th March, 1872, Dr. Hooker says: "I am very deep in your debt." He refers to the recent death of Lady Hooker, and also to the struggle between Kew and the British Museum. Ayster, through Parliament, had proposed, in the interests of the British Museum, to break up the Kew Institution. The Government did not seriously entertain the idea, but Ayster's unwise tactics got them into trouble, and much discussion took place on the subject. The English Botanists rallied solidly around Dr. Hooker, and prepared an address to the Government against the proposition. The similarity of their troubles made a stronger bond of sympathy between the two botanists.

Dr. Hooker signified his pleasure at hearing that Mueller's trial was over, and that he might hope for peace. His friends in England sympathised with him. In acknowledging receipt of fern stems, he states, "When ferns are taken up, fronds should be turned down on trunks and tied." He would like one from 20 to 30 feet; one 70 feet would hardly keep alive.

In reference to a copy of a report Mueller had written defending his administration of the Botanical Gardens, and expressing his ideas as to the functions of such an institution, Hooker writes:—

"Many thanks for your defence report, which reads capitally, and is temperate and judicious in the main; indeed, altogether as far as I know and can judge from so great a distance. The newspaper accounts are wicked when they attack and display a detestable spirit, which, however, you must outlive. I am so glad that the *Gardeners' Chronicle* article was useful. Dr. Martens was very enthusiastic about it, and it was wholly his own writing. We had many talks about it."

Regarding the transport of plants from overseas, he writes that few of the officers of vessels visit Kew, though invited; the city and their homes take their time. They are offered hospitality, bouquets, and so forth in return for their services, but they fight shy of the Herbarium. He thanks Mueller for axe-handles, etc., made from Australian woods for the Museum, and also for information about the *Todeas*. "Treeferns, etc., I shall be most thankful for," and will send, in return, a box of rare trees with clay round the roots. He wishes that he could figure more of Mueller's plants, but is afraid of them being cut out by something else. "The magazine itself is mortal. It lives by pleasing the taste of the public." The *Todea* will appear soon in the magazine.

June 22nd, 1872. He has received a "Noble Tree Fern," and reports as to others, "The noble *Dicksonia* you have given us is pushing fronds, the *Alsophila* not yet, but we do not despair of it. It is covered with a light canvas petticoat to keep its flanks moist, and stood in the most favourable place for growth. Our *Dicksonias* are the wonder of the world, all owing to my never allowing a dead frond to be removed, and the great *Todea* retains its luxuriance, it having now . . . 200 fronds on it wholly through my treatment. I have it stood in a sheltered place, surrounded with a shelter of stone and ferns, backed up by a layer of soil confined by cask staves."

Regarding their separate troubles—"I hope that you have passed your *ordeal*. I am far from the end of mine. Gladstone supports that Ayster through thick and thin, then attempts to get my correspondence, which has been called for in both Houses of Parliament. The enclosed address will reveal to you my position, and so I need say no more."

A newspaper containing the address accompanied the letter. Dr. Hooker is delighted to hear of more Chatham Islands plants. "What about the Antipodes, Bounty and Emerald Islands? Could no one go to them? Reverting to the beloved *Todea*, he says that it is in a

superb state. He is much annoyed at Fitch's drawing of it, reproduced in the magazine, which he describes as *miserable*. He asks Mueller's acceptance of Reuhenbecke's Ferns, to go with the next box, and mentions having received the largest specimen procurable of Cape of Good Hope Todeas, 90 lbs. in weight.

In Victoria, the movement put on foot, and discussed in Parliament and the Press to separate the positions of Director of the Botanical Gardens and Government Botanist had almost come to a head, and in answer to a letter from Mueller on 24th November, 1872, Dr. Hooker sends this reply with sympathetic advice:—

"Kew, Jan. 15th, 1873.

"My Dear Mueller,—

"I am in receipt of yours of 4/11/72, and much distressed to hear of your trials and vexations. It is not easy for me to indicate or even suggest a course of action—but, judging from what I gather from your friends here, of whom I have seen many and warm ones, I am disposed so far as to run the risk of intruding with the suggestion that you should let matters rest for a few months, making no complaint or stir, and when public attention is withdrawn from your present painful position, quietly consult a few of your many powerful friends about your future career, with a view to getting a thoroughly good artistic horticulturist and decorative gardener, to whom I should delegate the ornamenting and practical gardening; you only interfering in the matter of general directions, estimates, and so forth.

"This is the way in which I conduct this garden, and it is the only way that could answer. I am not a practical gardener, nor a florist. I am a botanist and landscape gardener. I look to my curator for giving all plants, and for the amount and kind of decoration required to gratify the public. He looks to me (1) for the general plan of the gardens; (2) the amount to be spent in decoration; (3) power to cultivate according to his judgment. All internal arrangements of plants in stores, houses, and beds, I order, subject to his opinion that they will grow well where I place them. He looks to me to provide seeds and plants, except the merely decorative, which he gets himself by orders countersigned by me, and for all information and countries, climates, and conditions that botanical collections require. I can truly say that, since I became Director in 1865, not an unpleasant word has passed between us, and that we have worked in perfect harmony. Just think over this.

"I really do not see how you can gratify the public with a floral display of the kind they like, nor how you can accomplish this without a gardener skilled in the modern fashion of gardening, and who should have a good deal of freedom of action. I set aside a specific sum for that purpose, and the Curator has absolute control over it, subject to my approval of his plans and actions. So many men are allotted to it, whom he engages and dismisses, simply informing me of it, lest I should find reason to disapprove of his course. I shall take care to keep

your documents private, and if I could suggest any course of action that would help you I should only be too happy. My motto in all such trials is *Servite animam æquam*.

"Thank you a thousand times for your continued thoughts of us under your trials and difficulties. Capt. Staepole has arrived with the *Todea* which I have to-day sent for. The two *Cycas*—Bentham's and mine—are both in a Tropical Tree-fern house. They have as yet shown no signs of life. The tall *Alsophila* has sent forth a few fronds, and I have every hope of it. George MacLeay has sailed by the "*Somersetshire*"—he takes a box of rooted variegated forest-trees for you. These I got from Paul, of Waltham Cross, and got him to pack them, too. I am glad that those by the "*Niagara*" arrived well. You seem to be surprised at Ayster's conduct to me. I assure you it is no worse than to other people; he has hardly a friend in the scientific world, nor has had for years.

"The British Museum is still striving to get the Kew Herbarium and Library transferred to itself, and a powerful memorial against the transfer is being addressed to Mr. Gladstone by the Botanists of England. Mr. Carruthers is acting a most unworthy part, and by his insolent demeanor and ungentlemanly conduct, is disgusting his former friends. This, of course, is private. So, my dear Mueller, with best wishes for your prospects and earnest advice to say as little as possible.

"Most sincerely yours,

"JOS. D. HOOKER."

The information in regard to the satisfactory working of the Kew Gardens is interesting, and the violent criticism of Hooker's administration in Parliament makes his sympathy for similar treatment in regard to Mueller the greater.

On May 6th he writes:—"I have little time to write by this mail, being much occupied with the illness of my brother-in-law, the Rev. G. Henslow, whose Botanical Notes you may have seen in *Nature*, and who is suddenly paralyzed, and his life despaired of, which throws a heavy burden and family responsibility on me."

He has received a second *Todea*. The *Cycas* are still inert; the *Alsophila*, after putting out a few fronds, has stopped, and has been laid on its side and clothed with moss. Mueller's *Boronia megastigma* has been figured for the magazine, and *Xerotes* and *Lepidosperma* received for the museum. Dr. Hooker expresses a hope that Mueller's troubles are ended. The hope, however, was unfulfilled, as the Directorship was taken away from Mueller during this year.

From Kew, on November 30th, 1874, he mentions the loss of his wife, whose assistance he deploras, and he had informed the officer of works that he could no longer overtake his duties, so that an official secretary was to

be provided. Re Australian trees, he affirms: "No Eucalyptus will stand at Kew except *Polyanthemos*. Our chilled, damp winter soil and cold long springs are totally opposed to Australian plants, even Alpines. It is not winter cold that does it, but damp and spring cold together."

During this period letters are scarce, but on December 13th, 1876, Hooker writes that his time is absorbed with the official work at Kew and the Royal Society.

"The *Correa Lawrenciana* with scented flowers, which Mueller was sending, "will be indeed an acquisition." On May 13th, 1877, criticising Mueller's book on School Plants, he says, "I do not like to see the introduction of such terms as *frutlets* in place of *carpels*, which every child should be taught."

Speaking of the Australian plants on March 11th, 1880, he writes, "The winter has killed them all. *Eucalyptus polyanthemos* alone defies the winter, owing, no doubt, to its roots being deep in the earth." *E. globulus* has never stood two winters."

In May, "Really the investigation of the Palms of Australia almost requires an expedition of itself. Could you not undertake it, including Lord Howe's Island and the survey." In June, whilst thanking Mueller for Notes on Vol. III. of his *Genera Plantarum*, he again refers to the Palms, "The Australian Palms are in a deplorable state of imperfect description. . . . It really is melancholy to find so noble an order so little known in the colonies."

On June 29th, the letter deals fully with Palms. In July, he mentions receiving a visit from Asa Gray, the well-known American botanist, October 1st, 1880; "Wentland has been here, and most kind and helpful. He certainly has a wonderful knowledge of them (Palms), both by habit and character."

October 6th. "The big Tree-fern trunk (*Dicksonia Antarctica*), which you sent here six years ago is a splendid sight; and the *Todea* goes on magnificently." May 14th, 1881. Concerning *Livistona australis*, our only Victorian Palm—

"It is alive, and there is every reason to expect that it will continue to live and eventually become a fine plant. . . . You ask about the results of the various packets of seeds you have from time to time sent us; these have yielded a large harvest of plants; but, as in the case of tropical countries, it is a very small portion that are worth cultivation, and still fewer

worth figuring. Many are shrubs that only flower after getting old, and have inconspicuous flowers."

To the Baron's request to be allowed to finish the North Queensland flora, he replies, "I only hope that you will do so. No Australian or Tasmanian plant is hardy in the South of England. *Eucalyptus Gunnii* withstands, or rather exists, under our atrocious climate, but none thrive, and no *Correa* would stand a single winter."

Kew, November 8th. He mentions the difficulty of getting artists to draw plants, Fitch having given up. "Mrs. Dyer is good, but has now a family to look after. Miss Barnard (Prof. Henslow's artist) draws beautifully, but is an invalid. I have been for two years training a distant relative, a Miss Smith (MS. of Botany), who will, I think, do well, and also has just begun lithography. Bentham is in anxiety, Mrs. Bentham having broken her leg. She is 82 years old and doing well."

June 10th, 1881. "Overhauling a whole heap of Brown's plants to complete a set. Brown's collections were enormous; it is marvellous what he did in that little ship; incredible."

He states that he has a second set of specimens from the British Museum, and is sorting and selecting for distribution; and it may be remarked that a selection of Robert Brown's plants was sent to the National Herbarium, Melbourne.

September 25th. He reports that a case of plants had arrived, the specimens in which were "stone dead," and relates, "In old days, when water was not laid on to the houses, and the young and the old gardeners had to walk a good way to fetch every pot of water, then hard-wooded ones were starved. Now it is all the other way, the soft-wooded ones flourish, and the hard-wooded ones are watered to death."

He states that Epacrids can only be introduced by seeds as the plants are killed by vaporization at the first heat in the cases. He asks for *Hymenophyllums*.

Correspondence during 1881-2-3 is relatively unimportant. On June 25th, 1883 he writes that Mr. Bentham is very feeble, and has been unable to come to Kew for weeks.

"Kew, March 4th, 1884.

"My Dear Baron,—

"I was vastly amused at finding my features engraved in the Melbourne paper, and I thank you very much for your kindly notice of me, all too flattering though it be. There are one or two little inadvertences in it. I was born at Helasville (Hales-

worth), Suffolk, three years before my father went to Holland, and I am only a *foreign* Associate of the French Academy. I took your kind respects to Bentham, whom I found much better. He can just walk across the room with a stick, and complains most of shortness of breath. He and I are sorry to hear that you are so poorly, and earnestly hope that the mountain air will do you good. I was indeed surprised to see the Catalogue of the Melbourne Gardens published without an allusion to the author of the collection, and the former head of the establishment and its founder in Victoria. I have written thanking the donor of the copy,* and adding that the absence of any allusion to your predecessor and the founder of the collection, both surprised and pained me. Nothing more. I cannot understand anyone behaving so.

"I am told that there are parties in Melbourne who sell dead trunks of *Dicksonia Antarctica* for the purpose of growing ferns upon them. Can you tell me whether this is so or not? We have a series of pillars in our Fern House formed of dead stems of Tree Ferns covered with living ferns; and we should be glad to get some dozen or two of trunks five feet long and upwards at a moderate price.

"Your great *Todea* is in splendid condition; it is impossible to count the fronds upon it. It stands in a layer of cement, with loose stones about the base, and one side covered with stones, etc., the other exposed, and it goes on getting finer and finer every year. Of course, it is in a shady spot. The big *Dicksonia* is in splendid order. *Dorysanthus excelsus* is flowering.

"Yours most sincerely,

"JOS. D. HOOKER."

In August, Bentham is back to Kew, but on the 31st Hooker writes, "Bentham is alive, but bed-ridden, and cannot even sit up in bed. I see him weekly, but he does not converse; and, after five minutes, asks me to leave. It is sad to see such an end of such a life. He will neither see people nor be read to."

December 8th, 1884. "If I do not answer a letter at once, I do not know when I may, so I break off my work at *Alternanthera mollifera* to thank you for yours just opened, and read of 23/10/84, and its most interesting contents."

On December 31st, 1884, he advises of the despatch of a few copies of *Genera Plantarum* for the sum of £6/15/4.

April 7th 1885. Tenison Wood, the well-known scientist, of Adelaide, had been nominated for election to the Royal Society, and the Baron had expressed surprise that he had not been elected. Hooker wrote that his recommendations were very meagre, and wanted backing up by geologists to put him in amongst the 15 out of no less

than 67 candidates. He deprecated canvassing, for selection was most carefully and honestly conducted.

*Mr. Guilfoyle.

"This year Wood's name was not up, and it was too late to put it up. Additions to his recommendations were wanted.

"Of 61 candidates this year, 1 had been up for 13 years; 1 for 7 years; 2 for 6 years; 2 for 5 years; 3 for 4 years; 5 for 3 years; 22 for 2 years."

"By the way, I have often intended to tell you that your long letters will come torn and crumpled frightfully, with the specimens often smashed across and reduced to powder."

June 27th, 1885. The Baron at this period was actively encouraging the exploration of New Guinea, and Dr. Hooker states, "I do hope that your efforts to get New Guinea explored will be crowned with success, but I know from experience how many reapers one must send on to get a little corn.

"All my time is now given to the Flora of British India, the completion of which will take the best of my working days if I live long enough to complete it."

"Regarding his favourite plants, he writes, "Your tree-ferns are splendid in the Temperate House."

(To be continued.)

EXCURSION FROM LOCH TO NYORA.

A small party journeyed to Loch on Saturday, November 19th, and were pleased to see at that railway station the Better Farming Traid, having on board our President, and other members of the Club. After looking through the train, which all members should at some time make a point of inspecting, a start was made for Nyora. Around Loch the vegetation consists mainly of introduced aliens, but towards Nyora some good native bush was traversed, where fine specimens of the Black-tongue *Caladenia*, *C. congesta*, and the Trigger-plant, *Stylidium*, were gathered. The Pale Grass-lily, *Caesia parviflora*, and the Cut-leaf *Xanthosia*, *X. dissecta*, grew along the railway fence, and here and there specimens of the Wiry *Bauera* were seen. All the ponds met with were swept, and the material was handed to Mr. J. Searle for examination. Mr. V. Miller attended with enthusiasm to the duty of insect collecting.

Our collections included the following:—Copepoda: *Boeckella symmetrica*, *Cyclops albidus*, *Attheyella australica*. Cladocera: *Simosa gibbatus*, *Pseudomoina lemnae*. Ostrocods: *Cypris leana*, *Cypridopsis minna*. Insects: *Notonecta* sp., *Coriza*, sp. Insect larvae: *Caddis*, *Chironomus*.—H. B. WILLIAMSON.

BIRD LIFE AT HORSHAM.

BY A. D. SELBY.

The country near Horsham, as seen from the windows of a railway carriage, does not look at all promising to an ornithologist. Wheat country and open, treeless plains, as far as the eye can range, are not ideal haunts for the great majority of native birds. But Magpies may be seen, in numbers, both the White-backed and Black-backed species; also a few Banded Plovers, Ground-larks, and Song-larks.

Fortunately, there are still a few strongholds for bird life in the district, among the best being the scrub along the Mackenzie Creek, now used as a channel to convey water from the Wartook Reservoir, in the Grampians, to the various distributing channels, and finally flowing



(Photo by A. D. Selby.)

Australian Brown Flycatcher.

into the Wimmera River. At Lower Norton, a few miles farther down stream, is some white sand country, covered with Banksias, Murray Pines, Eucalypts, Heath (*Epacris*), etc., and this locality teems with bird life; while at Quantong, still farther down the river, the seepage and waste from the irrigation ditches keep the

swamps full in dry seasons, and provide a temporary home for many waterfowl, driven in from "out back" by drought conditions.

In all, I have noted some 150 species of birds here, and there are more that I have not, so far, been able to identify. Much of the sandy country around Lower Norton has been thrown open, and the result is generally one (or two, at most) crop of wheat or oats—then the land abandoned as of no further use. Having been cleared of all timber and undergrowth, the soil blows this way and that, until the land becomes unsightly, all mounds and holes. Why not reserve a large acreage of it for a sanctuary—such as a part of the "Little Desert,"—between Horsham and Nhill? This is the last hope of many local birds.



(Photo by A. D. Selby.)

Grey Thrush feeding young.

Though Emus, *Dromaius novae hollandiae*, were driven out years ago, one old bird with several chicks passed through Quantong about Easter, 1927. As usual, when any rare bird appears, one of the local "sports" followed with a gun, but, fortunately, an Emu was not a big enough target for him!

Pied or Magpie Geese, *Anseranas semipalmata*, were first noted on October 15th, 1925. Seven were seen, flying down the river at Lower Norton. On March 2nd, 1926, I located seven of these birds, evidently the same flock, near the mouth of Mackenzie Creek. They were feeding on a grassy flat near the water. They stayed about the locality until October, 1926. I noted them many times between the dates mentioned, but, for obvious reasons, kept the fact to myself in this district. Sometimes one bird or more would be in a big Red Gum in the river. A favourite haunt, when the geese were not feeding, was a sand bank; the imprint of their feet could be plainly seen. One day there were three maned Geese, *Chenonetta jubata*, near them.

About October all but two of the pied birds disappeared; and I think that the two that remained must have nested near by, though I could not locate the nest. One bird was seen to leave a patch of tall wheat on the approach of any strangers, and return when danger apparently was past; but—no luck. I last saw the Pied Geese flying down stream at Quantong in March, 1927. The first time I saw birds of this species was at Bullock Swamp, near Yatpool, in 1918.

White-faced Herons, *Notophox novae-hollandiae*, though common, are worthy of mention. One example, a pure white bird, has been here for two years or more, and is locally known as a "Spoonbill." The herons of normal coloration, will have nothing to do with the albino. The Straw-necked Ibis, *Threskiornis spinicollis*, is a common species, and as useful as it is in other districts. Some stay all the year, but the main flock departs for distant nesting haunts.

A few White Ibises, *I. molucca*, make their appearance now and again, mingling with the flocks of Straw-necks. The Glossy-Ibis, *Plegadis falcinellus*, has been noted only twice. Two were seen on September 9th, 1927. They do not seem to be popular with the two larger species.

Spoonbills, *Platalea flavipes*, are numerous; while *P. regina* is a very rare visitor—one was seen recently. White-headed Stilt, *Himantopus leucocephalus*. Three or four examples were here several times in 1926-7. They are very shy birds. Small bands of Red-necked Avocets, *Recurvirostra novae-hollandiae*, were noted in a swamp with Stilts, but were much quieter than their neighbours.

Two Painted Snipes, *Rostratula australis*, were seen in October, 1927. *Gallinago hardwickii* is often observed along the mud-banks of the Wimmera. The Great Crested Grebe, *Podiceps cristatus*, is frequently noted on Natimuk Lake. *P. ruficollis* is common there, and a few Hoary-headed Grebes, *P. poliocephalus*, appear at times.

A pair of Blue-winged Shovellers, *Spatula rhynchotis*, was noticed on the river, near Quantong bridge; many of these birds have nested there. The Plumed Tree-duck, *Dendrocygna eytoni*, was observed at Natimuk Lake, and, on a swamp at Quantong—one only. Pink-eared Duck, *Malacorhynchus membranaceus* sometimes appear on the lake and swamps.

Ground (Mountain) Thrush, *Oreocincla lunulata*. Though this is the last spot in which one would look for this species, a pair nested in an old garden near Norton Bridge, in the season of 1926; while one arrived in Quantong, this year, 1927; but left again. I saw no sign of the species until 1926. It may have come from the Grampians via Mackenzie Creek. A Wedgebill, *Sphenostoma cristatum*, was seen at Lower Norton in 1926. The Chestnut-tailed Ground Wren, *Hylacola pyrrhopygia*, has been noted on two occasions at Lower Norton. It is very shy.

A pair of Black-shouldered Kites, *Elanus axillaris*, has been often noted about an old thatched stable near Lower Norton. This is a visiting species.

Specimens of the Plain Wanderer, *Pedionomus torquatus*, and the Red-backed Quail, *Turnix maculosa*, have been brought in by cats.

Starlings and Sparrows are a great nuisance here, as elsewhere. Every hollow tree has Starlings' nests. No cherries can now be grown, and grapes must be well watched. The Goldfinch is very numerous also, but is not a pest. I have had under observation a Goldfinch's nest, which, besides four of her own, contained an egg of the Horsfield Bronze Cuckoo, *Chalcites basilis*. Has any other member known a Finch to be victimised by a Cuckoo?

[Some years ago, in the Coastal Tea-tree, I found a nest of the Goldfinch, containing three eggs of that species and an egg of the Pallid Cuckoo, *Cuculus pallidus*.—C.B.]

AUSTRALIAN CHALCID-WASPS.

BY A. A. GIRAULT.

Nowhere else in the world has this extensive group of beautiful insects received such attention as in Australia; and this attention has been given sufficiently early to insure a more complete knowledge of the entire group than is possible to be had in any of the older continents. For instance, in Europe and America, settlement and commerce, especially as regards America, have long since changed the nature and extent of the chalcidid population; while their classification has lagged and is chaotic. But in Australia the native population is as yet intact, and has received very little destruction, and very little foreign addition, while the exploration and classification of the group are well advanced.

These insects, though small, are remarkable for their metallic or variegated colouration, or for their grace, and are attractive also because of their great numbers and great diversity of habits. For though the majority are carnivorous as parasites, nevertheless many are phytophagous, and actually inhabit or cause various kinds of galls.

There is one group of peculiar forms known as Fig Insects; they inhabit the various native figs. Two entire groups confine their parasitism to the eggs of various orders of insects, and are noteworthy because of their minuteness, some being no larger than a mote of dust, and as elusive to the eye. Among these are some of the smallest of known insects, but in this country veritable giants occur among them, as with some of the other chalcid groups.

There is a group which resembles, in size and colour, various wasps, and these are the largest chalcids. There is another group which I find fascinating because of their stout vigorous bodies and great agility; these are the Encyrtids, rich in diversity. They seem to quiver with life and energy.

But the fascination which I find most constant and most alluring in reference to these insects, is that which has to do with their associations. The quest, and the green and blue, and glory of Nature. This is the pleasure of their study—the quest and the rich and varied memories associated with it—the eager hunt and the rich spoil and the grandeurs of this glorious earth on which we live.

For, after all, their classification, though of much interest and of great educational value (requiring great

effort and giving every emotional experience) is but a dry and arid desert as compared to their collection which releases a flood of generous emotion. The one is scientific, the other poetic.

NEW SPECIES.

I have had the pleasure recently of receiving from Mr. F. Erasmus Wilson, of East Malvern, Victoria, a collection of these insects reared from galls upon gum trees, and including new species which are characterised here. This is a valuable addition. The types are in Mr. Wilson's collection, cotypes in the Queensland Museum.

ANAPHODEA NITENS, sp. Nov. (Mymarinae). As *galtoni* Girault but tibiae 1-2 yellow, fore wings very wide, 34 lines of cilia, fringes one-third width; funicles elongate, 2 over 4 times longer than wide, 1 quadrate, 6 two and a half times longer than wide. A distinct fuscous stripe across wing from distal half marginal. Glistening. Male antennae 13 jointed, funicle 1 quadrate, rest elongate. Characterised by the wide wings. Reared from ova of Weevil *Gonipterus*, sp.

Victoria: Ferntree Gully, Nov., 1927, F. E. Wilson. Types and Cotypes.

BOOTANOMYIA VICTORIAE, sp. Nov. (Megastigminae). As *unistriata* but face yellow up to just above the antennae, dorsal abdomen black except for indefinite yellow spots down the side, and an obscure yellow area dorso-lateral, near apex; a line of punctures down each side of meson of scutum. Scutellum with 4 bristles, 3 and 4 a little closer together.

Victoria: Ferntree Gully, May 13, 1927, (J. E. Dixon, National Museum, Types). New South Wales: Albury, Oct., 1927, F. E. Wilson (1 Paratype female).

CIRROSPILUS OCCIPITIS, sp. Nov. (Eulophinae). Section II. of Species table. Scutum green except lateral margins narrowly, green truncate at apex. Propodeum, occiput, scutellum between the grooves, coxae and femora (slightly splotched), green. Abdomen long, pointed. Pronotum except lateral margins narrowly, and six bands across the abdomen, including apex, also metallic green; the apical and basal bands of abdomen each about one-sixth length.

New South Wales: Albury, Oct., 1927, F. E. Wilson. Types and Cotypes.

METACRIAS VICTORIENSIS, sp. Nov. (Entedoninae). As *aeneiscaphus*, but spicule of club present, short; lateral aspects and apex of fore tibiae, distal half of tibia 2, the same of tibia 3 (less by a fraction), white. Joint 1

smaller but scarcely shorter than 2. Male scape rectangularly dilated. With *Ditropinotella compressiventris*, Girault.

Victoria: Ferntree Gully, Oct., 1927, F. E. Wilson. Types and Cotypes.

BRACHYCHRYSOCHARELLA NUPTA, sp. Nov. (Entedoninae), Coxae, femora, (Femur 1 latero-ventral only, 3 yellow longitudinally centrally), tibia 2, 1 above, centrally, spots on 3 below knee and before apex, above green. Jaws bidentate. Basal two-thirds of scape yellow. Two ring, three funicle joints, latter increasing, 3 one-fourth of pedicel, twice wider than long. Wing 2 with 18 lines of cilia, obtuse at apex. Labial palpi 2 jointed.

Victoria: Melbourne, Oct., 1927, F. E. Wilson. Types and Cotypes.

EURYTOMA NOX, sp. Nov. (Eurytominae). As *sculptura* but median basin ovate, finely punctulate along median line, rest foveate, no channel. Segment 5 over thrice 4, exceeding 2-4 united. Tegulae, scape, tibia 1, 2 beneath, knees, tips of tibiae, femora 1-2 except ventrolateral at basal two-thirds, 3 mesad, red. Meson scutellum sparsely punctate. Post marginal barely exceeding the short stigmal, marginal twice longer. Funicle 1 quadrate, exceeding pedicel.

New South Wales: Albury, Oct., 1927, F. E. Wilson. Type and Cotype.

TETRASTICHUS WALSINGHAMI, sp. Nov. (Tetrastichinae). Honey colour, black as follows: Ocellar area, antennae except scape, face, prothorax, hind lateral angle of pronotum, parapside except laterad, axilla except extreme inner corner, a large cuneate mark towards centre of scutum each side of median line, propodeum out to spiracle, median line of scutellum widely, 6 stripes across abdomen, 6 distinctly before apex. Propodeum, abdomen long, a distinct median carina on former. Funicles quadrate, half length of pedicel. Ring joints large.

Victoria: Melbourne, Oct., 1927, F. E. Wilson. Types and Cotypes.

EUELMUS MAWSONI, Girault, terrae, sub. sp. Nov. (Eupelminae). As typical form but legs aeneous, sides of flattened tibia 1, knees, tarsi, base and apex of middle tibia, apex of tibia 3 excepted. Ovipositor valves white, a little extruded. Mesopleurum bare.

Queensland: Toowong, H. James (Type in Queensland Museum). New South Wales: Albury, F. E. Wilson. (Paratype female).

SOME NOTES ON CHALCIDAE.

BY F. ERASMUS WILSON.

Chalcids, though most of them are more or less minute, form a very prominent and important section of the large order *Hymenoptera*. They are often referred to as *Microhymenoptera*. In Australia, the Chalcidae are very strongly represented, between two and three thousand species having already been described. As the greater number of these have been gathered in Queensland, it must be apparent that we have still much to learn about this interesting group.

They play a big part in maintaining the balance of nature in the insect world, as numbers of them are parasitic in their habits. Eggs of the Weevil, *Gonipterus scutellatus*, Gyll., parasitised by a small Chalcid, were collected in great numbers in South Australia recently by Mr. Tooke, and forwarded to South Africa to help control that weevil which has been accidentally introduced, and which is threatening the destruction of the Eucalyptus plantations. I have bred out a small Chalcid from *Gonipterus* eggs gathered at Fern-tree Gully and Millgrove, which Mr. Girault has named *Anaphoidea nitens*, and which may probably be the same species as collected by Mr. Tooke.

Rearing Chalcids from various galls or insect ova is an easy matter, and is also a pastime full of interest. All that is necessary is to place the galls in a wide mouthed bottle over the top of which is tied a piece of fine muslin, so as to allow free access of air into the receptacle. Galls in an airtight bottle almost invariably become badly moulded.



From a single gall one may be fortunate in breeding several different species of Chalcids. From the gall figured which was growing on a white box Eucalypt, I obtained numbers of a brilliant green species, *Ditropinotella compressiventris*, Gir, and also a new species, *Metacrias victoriensis*, Gir. All the insects, with one exception, emerged from the rounded basal gall, their points of emergence showing in the figure. The former species Mr. Girault considers as probably a parasite and the latter a hyperparasite.

As illustrating the number of things that can be reared from a single species of gall, it is on record that Mr. Walker (probably Commander J. J. Walker) bred examples of 75 different species of insects belonging to no fewer than seven different orders.

Another fruitful source of Chalcids is grass tussocks, where I have come across many when sieving for small coleoptera. I am greatly indebted to Mr. C. Deane for preparing the accompanying figure.

INTRA VITAM STAINING.

In reply to inquiries as to method of intra vitam staining of amoeba, Mr. J. Searle sends the following:—

The most satisfactory method of intra vitam staining of amoeba is the jelly method described by Messrs. Cropper and Drew, in their Researches into cell reproduction. A stock solution of 2 per cent. agar jelly is made with distilled water only.

Take 5 cc. of 2 per cent agar jelly,

0.2 cc. of 5 per cent. sodium bicarbonate,

0.1 cc. of 1 per cent, aqueous Polychrome methylene blue.

Make up to 10 cc. with distilled water.

This is melted and poured on 3x1 slip, where it sets when cold.

A platinum loopful of amoeba is smeared on a cover glass, which is then inverted and allowed to fall on the jelly film, when the stain diffuses into the cell while it is still alive. The nucleus stains a pale purple colour in ten minutes. Staining of the granules does not cause death of the amoeba, and it may even move for some minutes after the nucleus stains, but it then rapidly dies and becomes spherical.

Amoeba may be fixed, before or after staining, by means of formalin, absolute alcohol, or Schaudinn's solution (2 parts aqueous sublimate and 1 of absolute alcohol).—J. SEARLE.

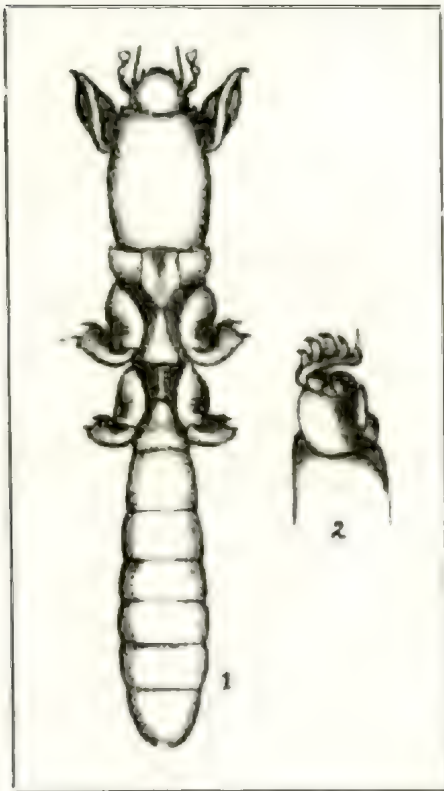
CLUB BADGE.—Members are reminded that the new Club Badge is now available in three forms—Brooch, pendant, and stud, for coat lapel, at 2/6 each. Application should be made to the Hon. Treasurer.

NOTES ON *CYLINDRACHETA*.

BY CHARLES BARRETT.

The need for special entomological studies in Australia is emphasised by recently published remarks on the genus *Cylindracheta*. We do not even know, certainly, whether this strange, wingless insect, rather wormlike in appearance, is a cricket or a species of web-spinner. Superficially, it resembles the familiar mole-cricket,

though more slender and elongated; but this likeness may be due to convergence; possibly *Cylindracheta*, as a result of its habits, has assumed its "questionable shape." If this proves to be the case, we have another wonderful instance of convergent evolution.



1. *Cylindracheta kochi*, Sauss.
2. Side view of fore leg.

This genus is also interesting as a link in the chain of affinities that connects South America with Australia. It supports the theory of a former land bridge between the two countries; or, one of the other theories that have been formulated to account for the fact that some plants and animals, very ancient types, in South America are related to Australian species.

When collecting in the Southern Andes, in 1926, Mr. F. W. Edwards, M.A., Assistant, Department of Entomology, British Museum (Natural History), obtained specimens of "a very remarkable insect called *Cylindracheta spegazzinii*, which burrows in the soil by means of its modified front legs, and attacks the roots of garden plants."

Mr. Edwards gives an account of his trip to South America, in the October (1927) issue of *Natural History Magazine*, an admirable quarterly journal published by the Trustees of the Museum. He was often on classic ground—where Darwin observed and collected, nearly a century ago. The expedition (a joint one, arranged by the British Museum and the Bacteriological Institute of the National Department of Hygiene, Argentine), was “almost like a second voyage of the *Beagle*, so many of the scenes made familiar by Darwin being re-visited.”

Most interesting to Australian entomologists, is Mr. Edwards' reference to *Cyindracheta*. “The first species of this genus,” he writes, “was described long ago from specimens from Australia, and was believed to be a degenerate kind of mole-cricket; it was not until 1915 that the Argentine species was discovered, and its describer, Giglio-Tos, was of opinion that it was in no way related to the mole-crickets, but belonged to a different order of insects, the *Embioplera*. It is hoped that a study of our material will decide whether this is really a remarkable case of convergent evolution due to similar habits.”

Our species of “wingless mole-cricket” is confined to Western Australia, and, far from being rare, is almost a pest, at times, in many gardens. Mr. J. Clark, F.L.S., Entomologist at the National Museum, has collected specimens of *Cyindracheta kochi*, Sauss., in different localities. Its known range is from Albany to Carnarvon. Around Perth, it is common, though not familiar—it lives, at least in the daytime, mostly underground, being rarely seen in the open, except by accident. Specimens usually are obtained during digging operations in the garden.

Its general habits, Mr. Clark tells me, are practically unknown, but the “wingless mole-cricket” tunnels in the ground, has been found in plant stems, and feeds upon roots and stems apparently. It seems to like potatoes; indeed, there is evidence that its tastes are not at all exclusive, and it may be regarded as a harmful insect in both vegetable and flower gardens.

Further study, Mr. Clark considers, may support the opinion of Giglio-Tos, that these insects are not mole-crickets, but web-spinners.

The illustration is from a drawing by Mr. Clark.

MOTH PUPAE AND THE WEATHER.

Of all branches of natural history, one of the most interesting is that of rearing insects from the larval stage.

The moth pupa, apparently, has the power of prolonging or shortening the period of the pupal stage. What is the cause of this variation in the pupal period? May it not be a provision of nature's to ensure the preservation of the species: all the members of a group, emerging at once, might be destroyed; but others, remaining longer in the pupal stage, would escape destruction.

It is frequently noticed that during heavy rain, especially after a prolonged dry spell, large numbers of moths appear on the wing, apparently roused from their inactivity by the rain. The caterpillars of these moths must enter the chrysalis at successive periods, as each matures, and the vast majority wait for the rain before emerging. Possibly the rain softens the ground, thus aiding the imprisoned insect to escape; but that this is not the only reason is evident. The same tendency to await the advent of rain is shown by bred specimens, housed in a dry breeding-cage. For weeks, at most only an occasional specimen emerges, but the first rainy day often brings out a number. It seems to me that atmospheric conditions are a big factor.

Mr. W. G. Barnard, of Toowoomba, told me of certain moth pupae which he obtained close to the sea. These were taken to Toowoomba, one hundred miles inland. A year past the due time for emerging; they were returned to their natural habitat, where they emerged in a few days. What sense had told them that they were "away from home"—creatures in a quiescent state in a closely-woven cocoon?

Several larvae of a handsome moth, *Danina banksii*, obtained in August, entered the ground in September. With the exception of one, all emerged during December. For some reason, this moth, of the same group in the same breeding box, under exactly the same conditions, did not emerge until the end of March. The weather, or seasonal conditions, also affect butterfly pupae. I have had the mistletoe blue, *Ogyris olans*, emerge 40 days after pupation, while another took 110 days during the cold weather.—C. BORCH.

EMUS IN THE MALLEE.

Prolonged dry conditions inland, compelled Emus to wander far from their usual haunts; in search of water and food. During September and October, I received from several correspondents in North-Western Victoria, notes of the occurrence of Emus in numbers. The birds in some cases ventured into paddocks, close to habitations; others were seen crossing roadways, or feeding in crops.

From Mildura, in October, a boy (H.G.) wrote: "Our school is near a lake, and there are a dozen Emus running on the surrounding country. We see them every evening when going home from school."

Another young observer (J.B.), writing from Mittyack, on November 1st, said: "Emus have been very numerous here lately, and have trampled down many fences. Although we are glad that they are here, we will not be sorry when they retire to their usual haunts."

"Large mobs" are mentioned by some correspondents. Undoubtedly Emus have been numerous early this summer, in localities where, as a rule, few or none are seen at any season.—C.B.

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THE FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall, Victoria-street, Melbourne, on Monday, January 16th, 1928. The President, Mr. E. E. Pescott, F.L.S., occupied the chair, and there were about 60 members and visitors present.

CORRESPONDENCE.

From Mrs. Dorothy Luher, thanking members of the Club for their expressions of sympathy relative to the death of her husband.

REPORTS.

A report on the excursion to Altona on Saturday, 14th January, was given by Mr. A. E. Rodda. The report on the Xmas Camp-out at Sealers' Cove, Wilson's Promontory, by Mr. C. Daley, B.A., F.L.S., was held over temporarily, in view of a proposal to hold a "Wilson's Promontory Evening" at an early date.

GENERAL.

The following motion, notice of which was given at the December meeting, was moved by Mr. L. L. Hodgson, on behalf of the Committee:—"That Mrs. V. H. Miller be elected an Honorary Life Member of the Club, in recognition of special services rendered and benefactions conferred upon the Club by Mr. and Mrs. Miller." The motion was seconded by Mr. A. G. Hooke, and carried unanimously.

LECTURE.

Mr. A. H. Mattingley, C.M.Z.S., delivered a lecture, entitled "Papua Re-visited," in the course of which he dealt with many aspects of native life and customs in Papua, and also referred to several of the more interesting plants indigenous to this region. A comprehensive series of lantern views illustrated Mr. Mattingley's remarks.

EXHIBITS.

By Mr. A. H. Mattingley.—(a) Fish-hook made of mother-of-pearl and bird's claw; (b) tusks of Dugong; (c) crocodile teeth—in illustration of lecture.

By Master Eric Mattingley.—Twelve ticks taken from the ears of a blue-tongue lizard.

By Mr. H. B. Williamson, F.L.S.—Dried specimens of 16 species of aquatic plants dealt with in his article in the January issue of the *Naturalist*.

By Mr. A. E. Rodda.—Branchlet and aerial root of Mangrove (*Avicennia officinalis*), with acorn barnacles attached, from Kororoit Creek, Altona.

By Miss B. Bolton.—Live specimen of Botany Bay Diamond Beetle (*Chrysolophus spectabilis*), from Bright, Victoria.

By Mrs. E. S. Hanks.—Specimens of Hyacinth Orchid (*Dipodium punctatum*), from Wandin.

By Dr. H. Flecker.—Fresh-water molluscs from Carum Creek.

By Mr. A. Carter.—Shells from Sealers' Cove, Wilson's Promontory.

By Mr. W. Hanks.—Sandstone of silurian age, covered with brachiopod shells of various species, from behind Pentridge Stockade, Coburg; also native rubbing stone.

By Miss Wigan.—Original letter from Baron von Mueller to Dr. Jamieson.

The meeting terminated after the usual conversazione.

EXCURSION TO RACECOURSE BEACH.

Twelve members and friends took part in the excursion to Racecourse Beach, Seaholm, on January 14. In the salt marshes, plants of Sea-Heath (*Frankenia*), Goosefoot, Horned Poppy, Salt-Bush, Glasswort, and other species were collected. In places the Glasswort (*Salicornia*) forms bushes 3 feet in height and more in diameter, in which White-fronted Chats and Goldfinches have been found nesting. Half-a-mile from the shore a flock of about 50 Black Swans were feeding in the shallow water, while on the extensive sandbanks, Sandpipers and Gulls (both the Pacific and Silver species), and Pied Cormorants, were numerous, with a few Dotterels and a Black-cap Tern or two among the Gulls. There was also a flock of seven Sea-Curlews, which our party disturbed several times.

A visit was paid to the belt of Mangroves, *Avicennia officinalis*, growing along the left bank of the Kororoit Creek, and, the tide being out, we were able to walk among them and note the numerous peg-like pneumatophores projecting upwards, and, occasionally, aerial roots stretching downwards towards the mud. It is interesting to note that this is the nearest place to Melbourne, where the Mangrove survives. Returning to the beach, some of us waded over the wet sand flats and shallow pools, and some interesting phases of sea life were observed. A particularly large specimen of the introduced Shore Crab was surrounded in very shallow water, and immediately showed fight by clashing its claws together in a threatening manner, until expertly picked up when immediately it gave in and became quiet. Some shells were collected by the conchologists of the party.—A. E. Rodda.

HISTORY OF FLORA AUSTRALIENSIS.

PART VIII.

BY CHAS. DALEY, B.A., F.L.S.

Aug. 17th, 1885. Dr. Hooker informs Mueller that his son, a mining engineer, is going to Australia seeking employment. He gives a letter of recommendation, and writes, "he is well educated and thoroughly dependable." From The Camp, Sunningdale, October 3rd, 1886, he writes:—

"I thank you exceedingly for the gift of your splendid volume on *Myoporineae*, which will add a huge corner-stone to the edifice you have raised to Australian Botany. It is a capital pair to the *Eucalypts*, and I can hope now that your labour will be carried on for many years to come. I have also to thank you for your many kind attentions to my son, Brian, who seems to be getting on well."

He writes that he is now occupying Bentham's room, and is engaged with the Indian plants, and has no time for Herbaria work on the Gardens. No letters are available for 1887 although there was no intermission of correspondence.

The next is from The Camp, Sunningdale, March 4th, 1888. He thanks Mueller for his congratulations on receiving the Copley medal, which he had not expected. "In my old age I felt that I had been rewarded enough, and to spare. I do hope that your turn of Royal Society honor may not be delayed. There are many scientists on the list for it."

He thanks the Baron for his notices of Brian, whom he is sorry to see speculating in gold-mining in Queensland. He should be content with an honorable position under government, and has become engaged to a Melbourne lady.

Returning to the subject of Botany, he writes:—

"Yes, the task of a Lamourier Key is immensely difficult. I have tried it myself; but, when I have done so I have thrown affinity to the winds, finding it impossible to correlate artificial and natural characters. I cannot encourage you to hope that your attempt will meet with the recognition that its labour and merit deserve—from the simple but lamentable fact that systematic work is ignored in the present condition of Botany.

"The flora of British India is ignored, and I am not aware of any converts in the many reforms introduced into the Natural Orders in the *Genera Plantarum*. The Orders *Viniferae*, *Coniferae*, and *Rubiaceae*, *Melastinaceae*, etc., are completely re-modelled, as are many others.

"For my own part, I never look for recognition or acknowledgment of such labours.

"We are still mourning Asa Gray's death. He and Mrs.

Gray spent last summer in Europe, and made a tour with me in Normandy, and he left the house for his home at the end of September in perfect health. I have known him intimately since 1838. You will find a notice by me in *Nature*.

"I am in hopes that you will get more New Guinea collections to describe. They seem to come in, and Forbes's last expedition to have been a failure. I am very sorry that you can give no better account of your health, and do hope that it will soon be restored; there is so much work still to be done."

The Camp, Sunningdale,

April 6/86.

My Dear Baron,—

Dyer tells me that you would kindly accept a more modern photograph of me than that you have. I take so little account of such things that I have no idea what it is you have; but on the chance I enclose what is not, I hope, a duplicate—if it is, please do what you please with it. I still think that the one by G. Walent, which was published in a series of *Presidents* by that gentleman is the best, though faint. I also send an excellent little one of my father, taken out many years before he died. My son, Brian, tells us he is married to a Victorian lady. I hope he has made a sensible match.

I am still toiling at the Indian flora. . . . Systematic Botany seems about centred at Kew, and what splendid collections there are at Leyden, Paris, and St. Petersburg. Japan and Java should be undertaken. The flora of the Straits Settlements is to be undertaken by King, with me as referee at Kew. King will, I am glad to say, be home this summer, in the end of May, and will, I suppose, lay the foundation of the work. His leave will be only for six months, so he will have plenty to do. He mentions being latterly at the Indian Orchids, *Oberonea* having nearly 42 species.

Cirencester,

Nov. 10, 1888.

My Dear Baron,—

I have to congratulate you on the announcement of a Royal medal being awarded to you for your many long, and distinguished services to Botany; long may you live to enjoy it.

I write from the house of my son, who is a medical practitioner. This town is a very interesting one on account of its Roman remains.

I am myself quite absorbed in Indian orchids, and their name is legion, and I am utterly confounded at finding how little has been done by anyone but Lindley towards describing any of the contents of the genera themselves.

Bentham did a wonderful piece of work in describing the order and limiting the genera; and, except in isolated cases, I do not see my way to any material improvement on what he did; but the species themselves are in a state of chaos that I had no conception of. No one but Lindley in his folio seems to have attempted to classify the species for a single genus.

The amount of direction I have to do is enormous, and this reminds me to ask you if you use Browning's platyscopic lenses for the simple microscope. I find them invaluable for clearness, and the immense area they cover. I get them mounted to fit the area of the microscope. They are 18/- each, and there

are four powers. The relief to the eyes after the ordinary lenses I have used all my life (including doublets, triplets, Coddingtons and the Compound) is greater than I can tell. If you send me the diameter of the ring or arm into which your lenses fit, I would get Browning to mount a couple of powers so as to fit it.

Ever sincerely yours,

JOS. D. HOOKER.

In a communicative letter from The Camp, Sunningdale, the first pages of which are absent, and evidently refer to matters previously mentioned, there is much information in regard to the great work, *Index Kewiensis*. The date of the letter is probably 1892. The remaining pages commence with a reference to the proposed work.

How to get it printed so as to sell at a reasonably cheap rate is the rub with a publisher, the prices will be prohibitive. There will be at least three vols. quarto, with 1,600 pages each, and three columns on a page, and there are upwards of 60,000 entries, and this up to the year 1885. I am now enquiring whether the Cambridge Press would have undertaken it.

Cambridge was Darwin's University, and three of his sons are settled there, two as professors, but I doubt if they could afford it without help, and I am seeing what I could do by touting amongst wealthy patrons of horticulture. Sir George MacLeay has given me £300 to begin with. I suppose we must print at least 1,600 copies, as the work will be wanted both by botanists and horticulturists. It gives the names, first authority (book and pen), and native country of every plant, and synonyms as far as possible, but the work must not be looked upon as an authority for synonyms. You will find every published name up to 1885; it professes no more. Of course, established synonyms are entered as sent; and, where possible, referred to their proper place; and this has, as you may suppose, given ceaseless trouble in the hundreds of cases where there are differences of opinion when a plant referred to several genera. All such cases are referred to Oliver and myself. In doing the Indian Outlines, the work has been invaluable to me. How else could I have found Reichenbecke's species published like yours in an infinity of periodicals. I shall soon send you a sample page. Do you think you could get any help towards publishing in Australia? Oliver and I have devoted much time to it, of course, gratuitously; so did John Bate, whose loss to Kew Herbarium is deplorable.

As for myself, I am very well, but getting old. I am just finishing the Outlines of the Flora of British India, a most unsatisfactory job that has cost me upwards of three years' labor. Reichenbecke's work is detestable; he did not codify a single genus, and his descriptions of species are so incomplete that I often have not known in what section of a genus to put his species. Had not Bentham done the Genera of the Order, I do not know where we should be. In doing India, I am in admiration of Bentham's treatment of the Genera, especially seeing what a confused jumble of published materials he had to deal with; and the badness of Herbarium specimens.

As for the rest, the *Flora of British India* and the *Botanical Magazine* take up all my time except the *Studal*, which I am revising after Jackson.

Ever, my dear Mueller,

Sincerely yours,

JOS. D. HOOKER.

In November, 1895, from The Camp, Sunningdale, he states that he is reminded of remissness in correspondence by a letter from Mr. Bufton, Tasmania, "who writes . . . of your good offices and his own botanical proclivities. It is delightful for me, in my old age, to find myself remembered in Tasmania, and I feel very keenly Mr. Bufton's kindness in writing to me and telling me of the progress of Tasmanian Botany and of his aspirations as a naturalist." He desires to be made a F.R.S.; "but," says Hooker, "I do not know if he has done any original work without which entry is now impossible." Regarding a new edition of Mueller's *Select Plants*, he writes, "It must gratify you to see the work often cited for practical purposes."

He notifies

"Sending you a lithograph of the best portrait of my father in the *Journal of the Kew Guild's Annual of the staff of Gardens at Kew*," of which he will try and get a copy. He states that the portrait of Brown is from an oil painting by Pierce, made for Lady Franklin, who had a gallery of such likenesses of her friends. "It was given me by Miss Caneroft, after Lady Franklin's death, and it is an admirable likeness of a great man in extreme old age. I think I sent you the little Wedgewood medallion of my father that I had made at Sturia; if not, let me know, as I am ordering some more to be struck off."

The geographers have good hopes of an Antarctic expedition with this Government. Germany and Norway are organising expeditions. The Norwegians were highly favored by the weather. It was an awful time when we were off Cape Adare. Ross would have given his ears to be able to land anywhere on the coast; and, if he could not, I am sure no one else could have at that time. As we experienced (1840-1) the seasons vary greatly; and, if we had had the weather of 1842-3 we should never have discovered Victoria Land, nor, perhaps even have approached it. I hear, too, it is quite clear, from Weddell's experiences, that the pack moves its position over vast areas. Nevertheless, I am inclined to think that the route *via* E. Coast of Victoria Land may be always more or less open, the currents being strong.

As to wintering, I extremely doubt the practicability of it; and, even if practicable, I cannot conceive any commander taking the responsibility of leaving a party in such a climate of wind, fog, and snow, and on such a coast, any part of which may be blockaded for years by bergs or packs, and remain for an indefinite period. Let Cape Adare be ever so acceptable now, a square mile of pack, or a couple of icebergs stranded off it might seal it up in a week for years. Graham's Land is the place to search for winter quarters."

This comment on Antarctic exploration, with which, in Ross's expedition of 1840, he had had experience, is of interest in view of the successful revival of Polar exploration by a party sent out by the Victorian Branch of the Royal Geographical Society, of which the Baron was President, the modest forerunner of the well equipped expeditions of the last 30 years.*

Dr. Hooker states that he is still at *Flora Indica*, and finds it very hard work identifying species.

His fourth son, Reginald, Assistant Secretary to the Statistician, has been appointed to a Government post in the Intelligence Department of Agriculture, being top of the candidates. The salary is £150 per annum, rising in £15 increments to £300 per annum, with a chance of promotion, and a pension at 60 years. Brian has an appointment to a position at Coolgardie at £450 per annum. He is a hard worker, and particulars about him are impatiently awaited.

"It is very gratifying to me that you keep in communication with his wife, who owes you so much," is the concluding sentence.

The Camp, Sunningdale,

March 2nd, 1895.

My Dear Baron,—

I have not yet thanked you for your acceptable letter of the New Year, with its kind felicitations, which I cordially accept and respond to. Only to-day I have received your address to the Geographical Section of A.A.A.S. at Brisbane. I have read it with very great pleasure and hot interest. It is capital and worthy of you, so full of sound matter and of sound sense, and all so well put that one "runs as one reads," and what a store of information it contains. The summary of a world's ways and means from an antipodal point of view, and that a British standpoint, is verily refreshing, and makes one's blood course faster. Thank you very much for it and its contents.

You may guess how deeply welcome your letter was, when I tell you that it is yet the only intimation I have of Brian's discovery of mercury at Coolgardie. I had heard from himself very shortly before (I suppose) the happy find. He told me that he had a good billet as manager of the White Feather mine, with £600 a year.

I am still struggling with the Indian Grasses, and Stepp is preparing the same order for the flora of Tropical Africa and S. Africa, so we have much work in common that benefits us both. The chaotic condition of the African grasses in the Herbaria is inconceivable, and I only wish that I could withhold publication till Stepp's is over, for I can foresee that his work

*See p. 37, writer's Memoir of Life of Baron Sir Ferd. Mueller.

will throw great light on the Indian that cannot appear till his is completed.

I am also busy with Banks's narrative, which necessitates a great deal of work in detail. Happily I am actively assisted in this by my son, Reginald (now in the Agricultural Department) as to which appointment I thank you heartily for your congratulations. I shall have to collect materials of Banks from this, the Royal Society's rooms, and of Solander from that, the Linnean Society's rooms.

The valuable feature of this work is the revealing of Banks in his right place as a working naturalist, the pioneer of the illustrious band of Naturalist Voyagers, of which Darwin is the culminant. It nowhere appears in the accounts of Banks's life and works that he was a *bona fide* naturalist, in which respect Hawkesworth does him no justice. Banks was further the interpreter of the expedition, the commissariat officer, so to speak, and the thief-catcher, to whose energy was due the recovery of the stolen quadrants, but for which the expedition would have been a failure. In short, but for Banks, the results of Cook's Voyages would have been confined to geographical discovery. His subsequent position as the Mæcenas of Science has eclipsed hitherto all he did in his early days as a scientific worker. Had he but published his collections, what a mark he would have made in the scientific world proper. As it was, he gave anyone liberty to make use of them, and except for the fragment of the Botany published by Brown, there was nothing gained by these magnificent collections.

The conclusion of the "Index" was indeed a relief, for which, at my age, I am more thankful than I can express, for I have always the fear of Saturn's scythe at my heels during the long period of its gestation. In one's 79th year, the inevitable steals on; the Ferns, so long an unfinished work, is in hand, and so it is with the Indian grasses; but, as nearly half of this is printed, I may hope to see it concluded by midsummer. I still go three days a week to Kew. I work here for the rest of the week. The miniature of my father goes by next mail.

Ever sincerely yours,

JOS. D. HOOKER.

Answered 18/4/96.

And now we come to the last letter which Dr. Hooker sent to his old friend from

The Camp,

Sunningdale,

June 12/96.

My Dear Baron,—

I have just opened and read yours of the 7th ultimo, and am much gratified by your notice of the Graminae of Fl. Brit. Ind. I wish that I could look upon it with even equanimity, much more with satisfaction, but the further I go on, the more convinced I feel that the work is only an introduction to the study of Indian grasses, and that future observations may much modify my conclusions. Then, too, there is a plentiful crop of blunders and omissions which turn up in the most unexpected places. Then in the chain of genera, several genera are absent—of obscure things that linked in out-of-the-way corners of the Herbaria, or of plants which, on a third revision, demanded generic rank.

66 *Pappus* must go into *Caleptra*, with *Calpodium*, and go next to *Poa*. *Phragmites Madagascariensis* must form a new genus *Regnania*.

The characters of 104, 105, 106 have got mixed by the printer (I suppose). I have just sent *Poa*, *Festuca* and *Bromus* to press. I gave them all to Stepp to discriminate and diagnose, as he knows European and Oriental grasses much better than I do. He has also done *Eragrostis*, a very difficult task. Then as the *Bambusiae*, are all worked up by Gamble, and it would be folly to interfere with his work, I have only to extract this matter, and put it in the form of the other genera of Grasses of British India, and give him the credit of it, etc.

Banks's journal is nearly free of the press, a copy shall, of course, go to you at once. It cost more labour to concatenate properly than I anticipated, and I have been powerfully aided by my second son, Reginald, who is an officer in the Board of Agriculture, and of a literary and mathematical turn. I hope the work will take in Australia, and give the world a higher idea of Banks than it had. There should be a monument to him in Australia.

The idea of giving you a musical salutation* on your birth-day (and mine) charms me. I did not know we were co-nated as to day and month, or I would have thought especially of you; all the more, as I had a musical jubilee, too. My youngest boy, Richard, *aetate* 12, having composed a very pretty piece for me. He is almost a musical genius, and delightful on the violin, full of feeling and expression.

At last Mrs. Brian has gone up to her husband with the children; he has just built a house for them at Coolgardie, Kanowna, where he has charge of a mine with £700 per annum, and liberty to look after others. I now think of all your kindness to his poor wife in her distress with much gratified feelings.

Ever, my dear Baron,

Most sincerely yours,

JOS. D. HOOKER.

The Baron would receive this letter about two months before his death in October, 1896, and although probably unanswered, it would, from its kindly expression of feeling, be specially welcome to him in his illness and comparative loneliness.

Thus, the long and unbroken correspondence between Dr. Hooker, the most prominent scientist of his time, and Baron Mueller, the distinguished Australian Botanist, came to an end in mutual interchange of kindly wishes and friendly thoughts.

It is a remarkable tribute to the simple worth of the Baron's character, and a convincing testimony to the high esteem in which he was regarded in scientific circles in Europe, that over a period of nearly fifty years, three such eminent and distinguished English botanists as

*By Liedertafel.

Bentham and the two Hookers—the two elder until the closing years of their lives, and the survivor until Mueller's demise—should have preserved so unbroken a friendship with a kindred soul, "whom not having seen," they could yet so well understand and appreciate.

In establishing Australasian Botany during the half century mentioned, the influence, judgment, and knowledge of these three great scientists, always available in the furtherance of Mueller's work, have had important effects, as valuable in their way as the practical scientific work of which *Flora Tasmaniae* and *Flora Australiensis* are the fruition and the crown.

Sir Joseph Hooker survived his fellow scientist for many years, honored and esteemed as the most distinguished botanist of his time, the great philosopher whose wide knowledge and powerful influence were successfully exerted in producing the wonderful change in scientific thought which followed the gradual recognition of the truth of the mutability of species, as advanced by Charles Darwin, his life-long friend.

Hooker's last public appearance among biologists was at the Centenary of Darwin's birth in 1909. He died two years later at the age of ninety-four, leaving an imperishable name.

Errata.—P. 186, line 11, *George Bentham*.

P. 187, line 53, (1832-1889).

P. 214, line 24, omit "two."

P. 248, line 7, 23, *Sarracenia*.

Gratefully &
affectionately
Yours,

W. J. Hooker

With united remembrance

in reply

J. Hooker

With respectful remem-
brance yours

Frederick Mueller

Signatures.

THE EASTERN AUSTRALIAN RING-TAILED
OPOSSUM.

BY DAVID FLEAY.

Our familiar little Ring-tailed 'Possum, correctly known as the Eastern Australian species, *Pseudochirus laniginosus*, is a characteristic inhabitant of the dense bush gullies, and, among other haunts, is not averse to taking up an abode in the gardens of both suburban and country dwellings. For many years I have been in close contact with it, both in the bush and in a "wild-tame" condition about our home. Some have thriven in captivity and reared numerous families.

Varying, in general colour, from silver-grey to brownish grey, this small syndactylous marsupial is too well known to call for a detailed description. The total length, from nose to tip of tail, is a little more than two feet; the face is characterized by large, protruding brown eyes and rounded ears, while the under-surface of the body is white. The strongly prehensile, thin tail is white on the latter portion, in proportions varying with individuals, and serves the active creature almost as a fifth limb. Unfortunately, more than one "ringtail" has been mistaken for a water-rat, and treated accordingly, owing to this partially white member.

The terminal portion of the tail is naked on the under-surface, and extremely muscular; and, if the marsupial is suspended by the tail, it rapidly climbs up it in hand over hand fashion! Silhouetted against the moon on a quiet night, or seen ambling along the limbs of the Eucalypts, with its tail held in a continued line from the body, the prowler is easily identified. The quivering hiss, so often given in alarm, is frequently heard.

As a general rule, the Ring-tailed Opossum constructs a bulky nest, amid the tangled Blackwoods, Wattles and Tea-tree of forest gullies; being found also in coastal Tea-tree, and established in the hollow branches of Eucalypts scattered over plain country. At times, the structure is placed surprisingly low, in blackberry bushes—the thorny wilderness evidently being a fairly safe retreat. The cosy home is frequently constructed of sprays, in pine trees, or in the wild cherry, *Exocarpus*, of the bushlands.

Unlike his relatives, the Common and Short-eared 'Possums, the "Ring-tail" is well advanced in home-

building methods, and I have noted two types of nest. One type is an open structure; the other, the usual domed home, resembling a large nest of the Sparrow, and possessing sometimes two entrance-holes. Externally, the home usually is composed of bracken fern, dry gum sprays and bark, while shredded bark constitutes a warm lining. The open nests, which seem to belong to lone 'Possums, often are converted into the larger, domed structures.

When pursued into the tree-tops, these animals pull the leaves together beneath them, and mingled, as it were, with the foliage, elude detection even by very keen eyes. Rarely do they return to a bush-land home if ejected or disturbed; and when I touch the nest in which



Photo. D. Fleay

Young Opossum, 10 weeks of age, being persuaded back to the pouch by its mother. (Note her grip of its tail.)

a captive specimen lives, the 'Possum carefully puts all the twigs in order again.

One free pair of the 'Possums have reared families in several successive seasons, in a garden tree. It was charming to see the mother invading the house at night, by way of a window, with the young ones clinging to her back.

On various occasions I have had the good fortune to

observe these animals nest-building by the light of the moon. The material is gathered in the fore paws and transferred to the tail, which curls round it; and thus the load is transported to the nesting site. The new bark, bracken fern, etc., is firmly placed in position, and intertwined with the previous construction by means of the animal's fore-paws and teeth; while inside the nest, the builder arching its back, pushes up the roof—in order, apparently, to maintain the spaciousness of the little home. The bulk of the occupants in a nest in my "Zoo" became so great, as the young ones grew up, that the floor of the nest fell out, and with it went the family!

Unfortunately, the "Ring-tail" has a habit of running for short distances over the ground, and so falls an easy prey to the alert fox—as many a little heap of silvery-grey fur bears witness.

The pouch of the female 'Ring-tail' contains four mammae, and each season, usually in May, June, or July,



Photo, D. Fleay.

Ring-Tailed Opossum with two young ones, 13 weeks old, clinging to her back. They are not yet permanently out of the pouch. (Note the mother's grip of their tails.)

from two to three young ones are born. Previous to this, in the usual pairing period of April and May, the animals fight bitterly, especially if a number be kept in the same enclosure; but, as a rule, the females and males battle only with others of their own sex. The young—which I have inspected within an hour of birth—appar-

ently crawl into the pouch aided by the mother, and there attach themselves. The points of the mammae become distended within the tiny mouths, and so prevent detachment. The tiny, naked creatures, if taken from the maternal shelter, even at this age, endeavour to return—a process in which the mother aids them. Nourishment is forced into the infants for two or three weeks, and a week or more from the time of birth, the pinkish body colour gives place to a bluish-black, as distinct from the flesh-colouring of young of the Common and Short-eared species.

Six to seven weeks after birth the young one, which is now extracting nourishment from the mother by means of its own activities, can be disengaged temporarily from the mammae. It can even be taken from the pouch, whilst the mother is always faithful to its hissing cries. Some 12 weeks after birth, fur, usually of a reddish nature, makes its appearance on the small bodies; and very soon they become too large to be contained any longer in the pouch. Occasionally the mother carries her offspring at night, and they cling with claws and teeth to the fur of her back. In times of danger, however, they are invariably carried off through the tree-tops in this manner.

When the young 'Possums are quite immature and still in the pouch, the mother often pauses in her nocturnal ramblings to sit up, open the pouch with both fore-paws, and thoroughly lick the infants with her small, pink tongue. When six months old the young animals drift away, or are violently ejected by the mother, who has cared for them so affectionately. Various fruits, rose leaves and petals, gum-tree blossom, and young leaves, and the foliage of many introduced trees, constitute the varied diet of these arboreal animals; and it is most entertaining to watch them sitting up and eating rose buds (some folks may think differently!) with loud chewing noise, and evidently much satisfaction.

The voice of the "Ring-tail" is a quivering "quiss-ss-ss-!", oft repeated, and during a scuffle between two of the animals, they seem to be almost sobbing.

The "Ring-tail," owing to protection, and a fairly ready acceptance of new conditions, appears to be one of the few native animals which continues to hold its own as settlement progresses—would that we could say the same of many others.

THE AQUATIC PLANTS OF VICTORIA.

PART II.

By H. B. WILLIAMSON, F.L.S.

POTAMOGETONACEAE (Pondweeds).

This family is represented in Victoria by six genera, three of which are marine—*ZOSTERA* (2 sp.), *CYMODOCEA* (1 sp.), and *POSIDONIA* (1 sp.). Of the other three, *RUPPIA* (1 sp.), *ALTHERIA* (2 sp.), and *POTAMOGETON* (9 sp.) grow in brackish or in fresh water, most of the last named genus favouring fresh water of inland ponds or lagoons in river flats.

Genus *ZOSTERA*, Grasswrack.

(Gk. *Zoster*, a belt, referring to the band-like leaves.)

These plants occur in masses in shallow sea water, often exposed at low tide. They grow from rhizomes and short stems bearing long ribbony leaves about one-sixteenth inch in width. Sometimes huge heaps of the dry plant may be seen on the beach. This is much used for packing material for fragile goods instead of straw. Flowers are unisexual and very minute, unprovided with a perianth, and attached to the thin flat rachis of a spike enclosed in a spathe consisting of the sheathing base of a leaf. On this flat receptacle male flowers, consisting of a single one-celled anther, and female flowers consisting of a single carpel with a two-branched style are intermingled.

ZOSTERA NANA, Roth. 1827 (including *Z. Muelleri* Irmisch, 1867). Dwarf Grasswrack. (Fig. 1.)

Under this may be placed most of the specimens collected on our coast line. The typical *nana* has leaves very narrow, with few secondary veins, presenting a slight difference in the bilobed summit, and also in the shape of the spathe, but Bentham was probably correct in uniting Irmisch's species under the older species. The author's specimens from Paynesville are apparently the true *nana*. Leaves vary from a few inches to over a foot in length, and from one sixteenth to one-tenth inch wide, with one central and two marginal veins, and from six to twelve finer nerves between. The leaves are notched at the end, thus showing two minute rounded lobes (1c). In this respect the species differs from the world-wide *Z. marina*, and also from the next species. At the base of the leaves the sheath (1a) covering the flowers or fruit can be found, and the edges may be lifted to expose the flat rachis bearing the minute flowers (or

fruit) (1b), with two or three vertical plates (bracteoles?) folded inwards over some of the flowers.

It occurs along the south and east coast of Australia as well as in Europe, Asia and Africa.

ZOSTERA TASMANICA, G. V. Martens. Tasman Grasswrack. (Fig. 2.)

This is easily distinguished from *Z. nana* by its longer and more dilated leaf sheaths, about 1 inch in length, and $\frac{1}{2}$ inch in width, and the absence of the bract-like folds. The leaves are not distinctly notched at the end. Apparently it has rarely been gathered on our coast since Mueller's specimens, "Port Phillip" and "Lady Bay." There are specimens from Barwon Heads, J. B. Wilson; and from Brighton, A. J. Tadgell. It appears to be confined to Tasmania and the south coast of Australia.

Genus CYMODOCEA. (Gk. *Cymodoke*, Sea Nymph.)

CYMODOCEA ANTARCTICA (Labill.) Endl. Sea Nymph. (Fig. 3.)

This is a marine submerged plant, with long wiry branching stems, showing numerous leaf scars. It can easily be distinguished by its leaves, which are distichous at the ends of the branches, from one to three inches in length, and about $\frac{1}{2}$ inch in width, curiously truncate or lunate, sometimes presenting a two-horned appearance. The leaves have their bases enclosed in broad sheaths, concealing the solitary flowers. Male flowers consist of two anthers, and the female flowers (on distinct plants) two carpels surrounded by connate bracteoles. It is restricted to the coasts of Australia and Tasmania. The author collected it at Barwon Heads.

Genus POSIDONIA. (Gk. *Poseidon*, Neptune.)

POSIDONIA AUSTRALIS, Hk. f. Fibre-ball weed. (Fig. 4.) A submarine plant with ribbony leaves, often two to three feet in length, and about $\frac{3}{4}$ inch in width, rounded at the end, and with numerous parallel veins. At the base of the stem is a mass of fibre, the remains of old leaf sheaths. Flowers are on spikes two or three inches in length, arising from a bunch of floral leaves, which are provided with sheaths up to 1 inch in length, persistent after the floral leaves break off. There is no perianth, and the flower consists of a carpel with a 2-4-lobed stigma and three stamens sessile on a connective with a few broad bracts which are only partially persistent. Australian and Tasmanian coasts only. No specimen collected on the coast of Victoria has been found in the National Herbarium, nor is there any



1, 2, *Zostera*. 3, *Cymodocea*. 4, *Posidonia*. 5, 6, *Althenia*.
7, *Ruppia*.

authentic record of the same. It appears to have been placed on our census on the strength of specimens collected on the adjacent coasts of Tasmania and S.A. (Beachport, etc.), and on the probability that it may yet be found on the Victorian coast.

Genus ALTHENIA.

(After J. Althen, a Persian refugee in France, who introduced the cultivation of madder.)

Submerged plants growing in fresh or in brackish water, with capillary stems and leaves, and male and female flowers on separate plants. Male flowers are two or three together, enclosed in the dilated base of the floral leaves, each consisting of three sessile anthers enclosed in thin sheaths or bracteoles. Female flowers are at first enclosed, but soon are projected from the sheaths so that ripe fruits are easily seen. By these, determination can easily be made, and without them is scarcely possible.

ALTHENIA AUSTRALIS (J. Drumm.) Aschers. Austral. Water-mat. (Fig. 5.)

Leaves are capillary, with dilated, stipular bases. Fruits in threes on a straight pedicel up to nearly an inch in length, each short-stalked, with a short incurved beak, and provided with a small bract (5a, 5b) or sepal. Australia and Tasmania only (W.A., S.A., V.) The only Victorian specimens in the National Herbarium are from the Wimmera and the Murray. It appears that confusion with *Ruppia* has led to this plant being recorded for the S.W., S. and E.

ALTHENIA PREISSII (Lehm.), Graebn. Slender Water-mat. (Fig. 6.)

A commoner plant than the last-named, and distinguished from it by its scarcely dilated leaf bases, the narrower stipular sheaths of the floral leaves, and its slender smooth, cylindrical fruits with their straight sili-form styles longer than the fruit (6a). It occurs in W.A., S.A., Tas., V. In Victoria it has been gathered in the Albert Park Lake, and in many places in the coastal parts.

Genus RUPPIA. (After a German botanist, H. B. Ruppius.)

RUPPIA MARITIMA, L. Sea Tassel. (Fig. 7.)

A plant very common in salt and brackish lagoons, chiefly along the coast. It is easily mistaken for *Althenia australis*, owing to the sheathing bases and stipules of the floral leaves, but the sheaths are wider.

and on close examination they may be seen to contain the young spikes (a), consisting of two sessile anthers, and from four to eight carpels (b). These spikes soon protrude on straight lengthening stalks (c), until they reach the surface, and after the anthers have fallen, to float away, the long, thin stalk becomes spirally convoluted, and the fertilized carpels are pulled below the surface. When straightened out these stalks are sometimes over six inches in length. The carpels, although at first sessile on the spike, are found when ripe to be on long straight stalks, sometimes two inches long. These stalks break off and carry the ripe fruit to the bottom, where the seed germinates. Some interesting observation work on the life history of this plant was done by members of the Club, Mr. J. Searle and Dr. C. S. Sutton some years ago, and the result was published in the September number of the *Naturalist*, 1919. No plant is more widely spread, as it occurs in all continents, and in every part of Australia.

Note on *Philydrium lanuginosum*, Banks:—(Part 1., January number). In addition to the two localities quoted, another one has to be recorded:—Sandringham, 1907, A. J. Tadrell.

CRANE-FLIES CAPTURED BY *DROSERA*.

Sundews are not selective in capturing insects, though some kinds may be more nutritious than others—more easily “digested.” Any small insect that alights upon or accidentally flies against a sundew, is likely to remain, and perish slowly. Even large insects become victims, for I have seen dragon-flies, dead, on *Drosera* plants, with gauze-wings and legs entangled.

But crane-flies (*Tipulidae*) especially seem to be in danger from the insectivorous plants. Where *Drosera peltata* grows thickly by the water-side, one day in October, I noticed crane-flies in numbers about them. And often a “daddy” was observed to touch a sundew, and, despite the shedding of long legs, become a captive. Many of the plants examined each held one or two crane-flies; some already lifeless, others struggling feebly.

Specimens of plants and insects, with field notes, were forwarded to Dr. Chas. P. Alexander, of Amherst Agricultural College, Mass., U.S.A., who is monographing the Australian *Tipulidae*, and in a recent letter he says:—“I was delighted to get the very interesting observations on the capture of these insects by *Drosera peltata*. . . . The fly in question is the *Trimicra pilipes* (Fabr.), to judge from the labels, although there were also sent a few specimens of the *Macromastix*. This is a larger, more blackish fly, and I believe the observations you give refer to the *Trimicra*, but possibly both species were involved.”

Trimicra, I believe, is the usual victim; where sundews enriched an entomologist's collection. But doubtless many species of “daddy long-legs” would reward a general foray among *Drosera peltata* and its allies, where the plants abound.—CHARLES BARRETT.

SOME NEW ORCHIDS FOR VICTORIA.

In the *Transactions of the Royal Society of South Australia* (Volume 51, 1927), Dr. R. S. Rogers, M.A., F.L.S., has described a number of new Australian Orchids. Five new species are recorded for Victoria, one species, which had hitherto been recorded under an old name, is placed in a new specific position, and three other Victorian species are more definitely described than previously. In addition, 11 other new species are described from other States. The new Victorian species are described below, the descriptions, which are taken from Dr. Rogers' papers, are given for the benefit of Victorian students of orchidology.

CALOCHILUS IMBERBIS, Rogers.

"This plant is well separated from other members of the genus by its *beardless labellum*, and by the conspicuous plate at the base of the column. The flowers, though not so regular as in the genus *Thelymitra*, show an approach to actinomorphy, which is very unusual in orchids. The lip is distinctly petaloid, but the lateral petals retain the shape which is common to all known species of *Calochilus*. It apparently occurs in considerable numbers."

DIURIS FASTIDIOSA, Rogers.

"This species approaches *D. palachila*, Rogers, very closely in the flower, but is well separated by its setaceous leaves and lowly habit. Whereas the lateral sepals are about equal in length to the petals in *D. palachila*, they are considerably longer than all the other segments in the new species, and there is no tendency to cross. Mr. Nicholls states that 'all the flowers point to the sky,' i.e., the labellum is more or less vertical. From this habit, the specific name is derived."

Tottenham. August, September.

PRASOPHYLLUM HARTII, Rogers.

"This *Prasophyllum* is not likely to be confused with any other published species. Its robustness (60 cm.), colour of flowers (reddish brown or prune coloured), most characteristic and extremely wide labellum cause it, in my opinion, to stand apart from all other members of the genus. The contrast between the green ovary and the dark flowers is noticeable, even in dried specimens."

Bairnsdale. November. Named after T. S. Hart, M.A., its discoverer.

CALADENIA ALPINA, Rogers.

"The new species approaches very closely to *C. cucullata*, Fitz., and *C. angustata*, Lindl., in both of which, however, the leaf is narrow-linear. From the former it is also distinguished by its long slender flower pedicels, the markings on the labellum (transverse interrupted red or purple stripes sometimes spotted), and the absence of the fimbriated calli; and from the latter by its wide blunt, and extremely incurved dorsal sepal and by the transverse markings on the lamina."

Mounts Hotham, Bogong; and Baw Baws. December, January.

This orchid was first collected by C. French, Jr., about 30 years ago, and recorded by Mueller as *C. carnea*.

Later, it was collected by A. J. Tadgell and W. H. Nicholls.

CALADENIA AUDASII, Rogers.

"This species occupies a taxonomic position midway between *C. Patersonii* and *C. clavigera*. From the former it differs in its entire labellum, in its relatively longer column, and in the colour of its flowers (yellow). From the latter, it is easily distinguished by the size and colour of the flowers, which greatly exceed those of *C. clavigera*, and by the presence of six rows of calli on the labellum.

Mount McIvor, near Bendigo.

This orchid was collected in 1896, and placed in the National Herbarium. The collector and month of collection are unknown. Named after J. W. Audas, F.L.S., of the National Herbarium.

PTEROSTYLIS ROBUSTA, Rogers.

This is the orchid which has been known in Victoria for many years under the name of *P. reflexa*. It is recorded by Ewart, and Sharman, as *P. reflexa*, var. *robusta*. It is illustrated in the *Victorian Naturalist*, Vol. XLII., 1925, p. 62, by Pescott and Nicholls as *P. reflexa*.

"It differs from the latter, in its shorter stem, wider leaves, and relatively short straight labellum, which does not protrude through the sinus of the lower lip."

It is widely distributed through Victoria.

The other Victorian orchids more fully described and dealt with are:—

Gastrodia sesamoides, R.Br., *Thelymitra Elizabethae*, F.v.M., *Calceana Sullivanii*, F.v.M., and *Caladenia carnea*, R.Br.

NAMING OF A FRINGE-MYRTLE.

At the January meeting of the Club, Miss L. Wigan exhibited a letter from Baron von Mueller to Dr. Jamieson, of Collins-street, Melbourne, dated 7/5/83, informing him that the writer had named one of the Fringe-myrtles after him (*Verticordia Jamiesonii*). The exhibit included the original specimen, taken near the Gascoyne River, together with label for same, and printed description from Wing's "Southern Science Record," March, 1883. A part of the letter is here quoted:—"I hope you will accept this homage to your talent and knowledge in the spirit in which it was offered; it may not be much, but is of permanency, and may some day still more be valued by your descendants. Though the plant is not strictly a therapeutic one, yet the volatile oil pervading this group of Fringe-myrtles is aromatic and antiseptic. Structurally, the species is very remarkable, even in a singular genus. Some day, doubtless this, with other *Verticordias*, will find its way into conservatories here and elsewhere."

Members of the Club will be very pleased by the news that Mr. J. A. Kershaw has been elected a corresponding member of the Zoological Society of London. As Curator of the National Museum, he has done much valuable work for Zoology; while his many years of service as an officer-bearer, have materially helped our Club to attain its present high position, as the foremost of its kind in the Commonwealth, and one of the leading popular natural history clubs of the world.

SOME ADDITIONS TO THE FISH FAUNA OF
VICTORIA.

No. V.

BY JAS. A. KERSHAW, C.M.Z.S.,

Curator, National Museum, Melbourne.

The following notes are in continuation of those previously published in the *Victorian Naturalist*, and commenced in Vol. 23, 1906. It was intended to continue these notes from time to time, with the object of ultimately publishing a list of the Victorian fishes, but circumstances have so far prevented this being done.

The only list dealing with our Victorian fishes is that published by A. H. S. Lucas in 1890, under the title, "A Systematic Census of Indigenous Fish Hitherto Recorded from Victorian Waters." This list comprised some 233 species, but this number has since been considerably increased, largely due to the excellent work accomplished by F.I.S. "Endeavour," under the direction of the late Mr. H. C. Dannevig.

Further trawling in the vicinity of our coast would undoubtedly bring to light many additional species, and add considerably to our knowledge of the fish-fauna of the State.

CEPHALOSCYLLIUM ISABELLA, Bonnaterre.
SWELL SHARK.

This small shark is well-known in New Zealand waters, and occurs also in Tasmania. Two specimens from Victoria are in the National Museum collection, one of which was captured at Flinders in November, 1907, and forwarded by Sir James Barrett.

It is a small species, growing to a little over 3 feet in length. The head is extremely broad and depressed, the snout short and rounded, and the mouth large. The teeth in both jaws are small and numerous, with three cusps. The skin, especially on the back, is rough, and in colour dark brown, with black bands and blotches. Along the sides are five or six irregularly rounded black patches, numerous small white, and a few black spots. Fins and tail have black patches and small white spots. The underside is creamy-white, with brownish-black spots; underside of snout and tail brown, with creamy spots and patches; inside of mouth creamy-white.

A peculiarity noticed in these sharks is the distention of the body with air or water. Waite mentions that, when taken from the water, the bodies were of relatively

enormous girth, due to the inflation of the stomach with water. When the abdomen was pierced with a penknife blade, a jet of water spouted to a distance of several feet. This peculiarity was noticed in a specimen which I saw captured by some crayfishers, off the north-west coast of Flinders Island, in Bass Strait.

An egg-case, obtained at St. Helen's, on the east coast of Tasmania, is long and narrow, strongly compressed above and contracting somewhat in width at each end. From each angle is produced a very long, slender tendril, which coils around and serves to anchor the case to seaweed. When taken from the oviduct the case is stated to be very pale creamy white in colour, with yellow tendrils, but after deposition it becomes darker.

ISURUS GLACUS, Mull & Henle.

BLUE POINTER.

A young example of this shark, measuring 4 feet 9 inches, was caught by a fisherman at Frankston. Although said to be common in New South Wales, and occurring in South Australia and Tasmania, it has not previously been recorded from Victoria. It grows to a length of about 12 feet.

NARCOBATUS FAIRCHILD, Hutton.

NUMBFISH OR ELECTRIC RAY.

This species was first obtained in New Zealand and was described by Hutton, in 1872. The first Australian specimen, which was obtained by the State trawlers from the east of Green Cape, New South Wales, was recorded by McCulloch, in 1919. Waite has since recorded it from South Australia. Our Victorian specimen, which was received in excellent condition, was captured at Lakes' Entrance, Gippsland, in June, 1902, and measures 2 feet 9 inches in length, and two feet in width.

The Numbfish, like some of the Rays, has a broad, flat body in form of a subcircular, perfectly smooth disc. The tail is short and stout. Two dorsal fins are present, situated close together at the base of the tail. The small, sharp-pointed teeth are in a band in each jaw, and the eyes small and placed immediately in front of the spiracles. In colour, it is uniformly chocolate-brown above and white beneath.

Electric fishes, of which several species are known, are furnished with an electric organ composed of vertical hexagonal prisms, situated on each side of the head, with

which they kill or paralyse their prey. Large specimens are said to be able, by a single discharge, to disable a full-grown man.

These fishes inhabit deep water, and are rarely obtained except by trawling.

NARCINE TASMANIENSIS, Rich.

LITTLE NUMBFISH.

This species has been recorded from Victoria by Castelnau, who stated that he had seen, on the St. Kilda beach, a mutilated specimen measuring over 6 feet in length. As it usually grows to only a little over a foot in length, his identification must be regarded with considerable doubt.

MACRORHAMPHOSUS ELEVATUS, Waite.

BELLOWS FISH.

On a previous list (*Victorian Naturalist*, XXIII, 1906, p. 125), I recorded a specimen of this fish, obtained at Queenscliff, under the name of *Centriscus scolopax*, Linn., *var. elevatus*, Waite.

McCulloch, in his Report on the fishes obtained by the F.I.S. "Endeavour," 1911, states that, after comparing specimens of both *M. scolopax* and *M. elevatus*, he was able to point out well-marked specific differences between them. I am now able to record a second Victorian specimen, recently obtained by a trawler, off Gabo Island.

Examples were obtained by the "Endeavour" from Bass Strait and New South Wales waters at depths ranging from 22-68 fathoms.

HOPLICHTHYS HASWELLI, McCulloch.

SPINY FLATHEAD.

This is a deep-water fish, and a number of specimens were obtained by the "Endeavour" from New South Wales and southern Australian waters, at depths ranging from 70-320 fathoms. The type, measuring 530 mm., was obtained in 1906, east of Port Jackson, in 800 fathoms.

Of two Victorian specimens in the Museum collection, one was obtained in a box of flathead sent from Queenscliff, and the other taken by a trawler, near Gabo Island.

The head is very broad and flattened, and furnished with numerous strong spines. A bony plate extends from the nostrils backwards between the eyes to the back of the head, with numerous radiating ridges, in the centres of which are strong spines. On the opercles are

similar bony ridges armed with small spines. The eyes are large, and the lower jaw protrudes beyond the upper. Extending along the whole length of the body to the tail is a sub-dorsal series of strong bony plates, each furnished with strong blade-like spines, from which radiate a number of small ridges.

In life the colour is stated to be pinkish-yellow above, mottled with darker spots, and white beneath. The dorsals, caudal, and pectoral fins pinkish, the former with rows of black spots between the rays. The margin of the caudal is black.

PARMA MICROLEPIS, Gunther.
SCALY-FIN.

Although not previously recorded from Victoria, this species is not uncommon in rocky situations. Specimens in the National Museum collection were taken in Hobson's Bay, at Mornington, and Portland, and one was taken in the Saltwater River, close to Melbourne.

It is well-known in New South Wales, South and West Australia, and attains a length of from 6 to 7 inches. The adult is uniformly black, with a white patch on the gill-covers. The young, however, are subject to great variation, and are brilliantly colored with orange, and with broad blue lines running backwards from the head. The dorsal anal and ventral fins are brightly ornamented with red, blue and orange.

SIPHONOGNATHUS ARGYROPHANES, Rich.
TUBE-MOUTH.

This novel and highly interesting species is remarkable for its long, narrow, and greatly lengthened snout. It measures nearly 17 inches in length, and is not more than 1 inch in depth. The snout is about 3 inches long, the mouth small, and from the extremity of the upper jaw is produced a long, skinny barbel, which hangs down before the mouth.

In colour the Tube-mouth is dark green above, paler on the sides, with a narrow silvery stripe extending the whole length of the fish, and on to the sides of the snout. The underside is white, with numerous red spots.

This species was described in 1857 from a specimen obtained at King George's Sound, in Western Australia. It is said to be fairly common in South Australia, but has not previously been recorded from Victorian waters. Our specimen was recently obtained at Geelong.

CANTHERINES MOSAICUS, Rams. & Ogilby.

MOSAIC LEATHER-JACKET.

The single specimen of this species was caught at Lightning Rock, near Queenscliff, in December, 1881. It was also obtained by the trawler "Endeavour," 20 miles south of Cape Everard, Victoria, in 69 fathoms.

According to McCulloch, this species undergoes considerable changes in form with growth, and in old specimens the characteristic mosaic-like markings, from which it derives its name, disappear. The skin is smooth, and of a reddish or yellowish colour, ornamented with blue lines forming hexagonal figures, many of which enclose a brown blotch.

It grows to a length of 16 inches, and is distributed all along the southern coast, and extends to New South Wales and Tasmania. It has been obtained chiefly by trawling, and appears to be rare in Victoria.

ANASPIDES AT HOME.

During the Congress of the Australasian Association for the Advancement of Science, at Hobart in January last, one heard much of the Mountain Shrimp, as *Anaspides tasmaniae* is popularly termed. Famous among naturalists, this wonderful little crustacean is well-known even to bushmen in its island home, though few of them perhaps are aware of its distinction, as "a living fossil."

Many of us, who attended the Congress, were privileged to see *Anaspides* "at home" in the beautiful mountain streams near Hobart. At low altitudes, it was not found—it is a true mountain lover, and flourishes in cold running water of the upper reaches, also in the pools which are so clear that their inhabitants may be easily observed.

Anaspides is so abundant, in favorable conditions, that a pool may contain hundreds of varying size, from midgets to "giants" two inches in length. They walk among weeds and over the water-smoothed stones in a leisurely manner, but dart to cover if a hand be dipped near to them. Yet, with a little caution and patience, specimens may be captured by the hand. They dart forward, not backward, propelled by a flicking tail, and seldom was one observed to swim.

An admirable account of the Mountain Shrimp is given by the late Geoffrey Smith, in his book, "A Naturalist in Tasmania." He says that *Anaspides* browses on mosses and liver-worts, and any small creatures it is able to catch. We saw it nibbling at submerged plants, and ambling around as if on the look out for unconsidered trifles. It is an entertaining creature, and looks what it is—a survival of species, a link with the past, as notable among crustaceans as the Platypus is among mammals. Like Geoffrey Smith, when first I saw *Anaspides* walking quietly in a crystal pool, I seemed to be living in the age of giant reptiles, and a bird song from the forest sounded unreal—for birds had not been evolved when the mountain Shrimp's ancestors dwelt in the sea.—C.B.



NATURE NOTES DESIRED.

It should not be difficult to fill several pages of this section of our journal, each month, with notes of general interest. The Editor again appeals to members to contribute brief records of things seen on their outings, or original notes from the study. That many members do write such notes is proved by the number appearing in newspapers. Send some to the *Naturalist*. Country members especially are requested to help the Club in this way.

THE GOSPEL OF AUSTRALIAN TREES.

One of the most difficult things that we naturalists have to do is to create a national sentiment for Australian trees. I was compelled last month to enter the lists on behalf of the Club, against the decision of the Minister of Forests to sell *Pinus insignis* trees on the railway stations at sixpence each. After repeated attacks, the Minister announced that he was prepared to sell any kind of tree; but the statement was previously made that Pine trees were the best for shade and planting purposes.

When shall we be free from the baneful influence of the Monterey Pine! It is a poor timber tree at best; and if Australia must plant it, let it be under forest, and not under roadside conditions. The finest trees in the State of the Coast Banksia, were in an area of park land just over the Mordialloc Creek. Taking Dr. A. W. Hill, Director of the Royal Botanic Gardens, Kew, England, to see these in January, we found that they had been cut out, and a new High School erected in the grounds. It would seem that these trees could easily have been left, and the building placed in another part of the grounds. And the irony of it will be that very soon, the Education Department will be planting trees all about the school ground.

A few years ago, at Harcourt, it was decided to have a park. In the area selected were two magnificent redgum trees. These were ruthlessly cut down, and the park fenced. Then the authorities immediately commenced to plant the park with trees and shrubs, most of which were Australian.

Almost every country is freely planting our native shrubs and trees; the demand for seeds of Australian plants is so incessant and constant, that we cannot keep pace with them.

There is an avenue of Australian gum and wattle trees miles long in South Africa; all over Africa where trees will grow, our trees are planted. We hear the same tales from India, America, France, Palestine, and many other countries, where our trees are being planted by the hundred thousand.

The pine planting policy is a poor one! and if only, say, *Eucalyptus ficifolia* were planted in hundreds in our streets and along our roads, what a wonderful place we should live in, in a few years' time.

I have heard that, up till recently, an ordinance existed, compelling the planting of Poplar trees all over Canberra! Think of it! Foreign trees in masses at our Federal Capital!—E. E. PRESCOTT.

SOME ALPINE BIRDS.

On a recent visit to the Bogong High Plains, I was interested in noting the different species of birds that inhabited that locality. The High Plains vary in altitude from 5700 to 5900 feet, with occasional peaks exceeding 6000 feet. In all, 24 species of birds were met with, three species being still nesting at the time of my visit—the middle to end of January.

The bird that I was most surprised to encounter was the Olivaceous Whistler, a pair of which inhabited a patch of scrub, near the Tarroonga Hut. I believed them to be still nesting, but made no effort to locate their home. At 5900 feet a pair of White-breasted Chats were noticed, the male being in particularly fine plumage. One always expects to find Flame-breasted Robins at extreme altitudes, and true to their habits, they were extremely plentiful. A nest was located beautifully protected by an overhanging rock, and within a few feet of a waterfall. It contained three nestlings in down. Most of the adults, however, were very busy feeding young that had left the nest some few weeks. Silver-eyes were also housekeeping, and two nests were found built in heath bushes growing in sphagnum bogs. The only other birds met with that were still nesting were a pair of Yellow-faced Honeyeaters, who had a nest in a Snow Gum, which contained half-fledged young.

On two or three occasions Wedge-tailed Eagles were observed soaring high over the plains, and three Sparrow Hawks were seen almost every day during my visit. Painted Snipe frequent the sphagnum bogs, and once one was flushed from a clump of Snow Pines on a dry slope. The only other game birds noticed were a few examples of Painted Quail, which were flushed from amongst the Snow grass tussocks. I picked up from the edges of a small tarn wing feathers of a Black Duck, showing that passing birds occasionally stop there.

A flock of about 25 Gang Gang Cockatoos flew over the hut every morning, and seven Black Cockatoos were always somewhere in the vicinity. Amongst the Snow Gums one could see evidences on all sides of their searches for wood boring grubs, quite a number of the smaller trees having been felled as a result.

The most remarkable case inspected was where a green tree, 4 inches in diameter, had been cut down by the birds. Pennant's Parakeets were often seen, but very few birds in adult plumage were amongst them.

Two other species of Honeyeaters besides the Yellow-faced were daily visitors to the Hut vicinity, viz., the Crescent and the Spine-billed Honeyeaters. A pair of White-backed Magpies were accompanied by two well-grown young, but I am doubtful if they were reared in the vicinity. Brown Tits and White-browed Scrub Wrens were very numerous wherever there was sufficient cover, and both species evidently rear broods at this altitude. The flowering Snow Gums had attracted fair numbers of Red Wattle Birds to the High Plains, and in one instance a young one was seen that had only recently vacated the nest. Both Spotted and Allied Pardalotes were occasionally heard, and twice White-shafted Fantails visited the Hut. At Salt Camp Creek, near Mt. Fainter, two examples of Hensfield's Bush Lark were observed. The only other species of bird under notice on the High Plains were Crows? a flock of which were encountered near the Snow Pole line.—F. E. WILSON.

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THE FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall, Victoria-street, Melbourne, on Monday, February 13th, 1928. Mr. A. E. Keep, Vice-President, occupied the chair, and there were about 120 members and visitors present.

REPORTS.

Reports of excursions were given as follow:—Phillip Island, Mr. L. L. Hodgson; Coburg, "Bad Lands," Mr. J. H. Harvey.

ELECTION OF MEMBERS.

The following were duly elected on a show of hands:—As Ordinary members:—Mr. Arthur Cox, Senr., 27 Hope-street, Spotswood; and Mr. C. R. Scott, 131 Thomas-street, Hampton.

GENERAL.

The Chairman extended the congratulations of the Club to Mr. H. B. Williamson, F.L.S., on the fact of his valuable research work in Botany having been recognised by the Council of Scientific and Industrial Research, which had awarded him a grant for further field work from the fund at its disposal.

Mr. J. A. Kershaw also received the congratulations of members, on his recent election as a Corresponding Member of the Zoological Society of London.

LECTURES.

The evening was devoted to the National Park, Wilson's Promontory. Mr. J. A. Kershaw, C.M.Z.S., read a short paper, detailing the events leading to the proclamation of the Promontory as a National Park, and described the aims of the Committee of Management in introducing native fauna and flora, and making the Park attractive to tourists. Interesting lantern views were shown.

Mr. C. Daley, B.A., F.L.S. gave a full account of the visit of Club members to Sealers' Cove, on the Eastern coast of the Promontory, during the Xmas holidays. A series of lantern views, from photographs taken by Messrs. L. L. Hodgson and H. P. Dickens, was then shown, brief remarks being made by the former.

EXHIBITS.

By Miss J. W. Raff, M.Sc., F.E.S.—(a) Larger Dodder-laurel (*Cassytha melantha*), on Blackberry and on Native Musk, showing very extensive development of haustoria. Collected at The Gorge, Launceston, Tas. (2) Spider with egg-mass or cocoon, taken from its nest in Tassel Rope-rush, near Port Arthur, Tas.

By Miss F. Smith.—Dried specimens of (a) *Hibbertia volubilis*, commonly known as Snake-vine, the flowers of which have an unpleasant scent, and are the largest in the genus, often being two inches across. (b) *Pultenaea stipularis*, a very distinctive species, with its numerous long, scaly stipules, which hide the stem. Both specimens from New South Wales.

By Mr. H. B. Williamson, F.L.S.—Dried specimens of seven species of aquatic plants dealt with in his article in the January *Naturalist*.

By Mr. Chas. Barrett, C.M.Z.S.—Mountain Grasshoppers, *Acridopeza reticulata*, from Hamilton district.

By Dr. H. Flecker.—Fresh-water molluscs (*Limnæa*) from Merri Creek.

By Mr. J. Stickland.—Photo. of snake and young.

By Mr. V. H. Miller.—Shells from Sealers' Cove, Wilson's Promontory.

By Mr. C. Daley, B.A., F.L.S.—Five sketches of Sealers' Cove; also dried specimens of ferns and eucalypts collected near Sealers' Cove in December, 1927.

By Mr. J. A. Kershaw, C.M.Z.S.—Series of photographs of National Park, Wilson's Promontory.

By Mr. C. C. Ralph.—Series of photographs taken at Wilson's Promontory.

By Mr. A. E. Rodda.—(a) Bones of Mutton-birds and Penguins, from midden near The Nobbies, Phillip Island. (b) Crustacean parasites taken from Leather-jacket fish, Cape Woolamai.

By Mr. L. L. Hodgson.—(a) Dried specimens of Cushion-Bush, *Calocephalus Brownii*; (b) specimens of rock (showing crystals); (c) flint and quartz chippings, from kitchen middens; (d) shells from Cowry Beach—all from the vicinity of The Nobbies, Phillip Island; (e) dried flower of Saw Banksia, *Banksia serrata*, from Wilson's Promontory; (f) bark of Paper-bark Tea-tree, *Melaleuca ericifolia*, from Lilly-Pilly Gully, Wilson's Promontory; (g) shells from Sealers' Cove; (h) photographs taken during excursion to Phillip Island, January, 1928.

By Mr. C. H. Borch.—Case of insects from Wilson's

Promontory, including six species of butterflies, 36 species of moths, and two species of beetles. The butterflies include specimens of *Heteronympha solandri*, which is a new southerly record for this species. Collected during Club excursion in December, 1927.

By Mr. F. G. A. Barnard.—Plant of Kangaroo fern, *Polypodium pustulatum*, Forst., obtained at Lilly-Pilly Gully during Club Excursion to Wilson's Promontory, December, 1914. Grows there on the ground, as well as on other vegetation. Two lizards just as emerged from the eggs.

By Mr. A. E. Opperman.—Specimen of Fungus (?) *Boletus portentosus*, B. and Br., from East Ringwood. Circumference of pileus, 60 inches; weight, 7 lbs. Flowering branches of Cedar Wattle, *Acacia elata*, grown at South Warrandyte.

BLACKBURN BIRD NOTES.

The birds that frequent my garden were unusually active last spring. Food, in the shape of nectar, grubs, insects, etc., has been abundant, so that the most fastidious tastes have been catered for. Even the Yellow Robin and the Rufous Fantail have ventured away from their haunts, in the shelter of the scrub which fringes a little creek half a mile away, and have met with the warm welcome their confidence deserves.

Among our many Blackbirds is one with the richest song I have heard. This season, after having hatched a brood of two, his mate, on October 24th, was sitting again. I knew it long before I found the nest, from the wonderful singing that, for two or three days, came almost incessantly from the loftiest tree, or telephone-post. Then he settled down to his duties, and his song became more intermittent.

The first nest had been built in a tree right in front of my window, and I could see plainly that there were no half-measures in the way the Blackbird did his work. He returned so quickly from each foraging excursion, he could have had no time to enjoy a snack himself. The second nesting site must have been a happy inspiration of the mother bird, for I found it tucked snugly into a thick clump of a Dorothy Perkins rose. Trails of this rose, which this season bore incredible numbers of flowers, surrounded the nest in cascades of pink blossom. Here, two more eggs were hatched.

The same glorious song notes of the male-bird again—and I found his mate once more brooding in the first nest. A day or two of joyous song, and the male once more settled down to his duties until two fledglings had flown (November 16th).

One fledgling formed the third brood, and by January 1st I felt convinced that the mother was brooding again. There were the same tokens—the protracted absence of the female, and the rich notes of the male, which darted here, there, and everywhere in quick, furtive flights, that baffled me. This time all my efforts to find the nest were fruitless.

I should like to hear of other such instances, though it is possible that these "frequent" families may not meet with the same encouragement from orchardists in the district.—(Mrs.) E. COLEMAN.

NOTES ON THE NATIONAL PARK, WILSON'S
PROMONTORY.

BY J. A. KERSHAW, C.M.Z.S.

(Synopsis of paper read before the Field Naturalists' Club of Victoria, February 13, 1928.)

The proposal to set apart the whole of Wilson's Promontory as a National Park and permanent sanctuary for the preservation of Australian fauna and flora, originated with the Field Naturalists' Club, and was the outcome of a special trip made at Xmas, 1884, by three of its members—Messrs. J. B. Gregory, A. H. S. Lucas, and — Robinson. In concluding the account of their trip, the authors' said:—"Practically inaccessible as it is at present, we believe that a future yet awaits it as a summer haunt of lovers of nature, and lovers of scenery. We prophesy that . . . not many generations will pass before means of communication will enable Victorians to find out and do justice to this noble granite promontory, the Cornwall of Victoria."

More than 40 years have elapsed since this prophesy was made, but it has proved to be quite true.

The area permanently reserved comprises about 101,730 acres, and embraces the whole of the Promontory and the adjacent islands. The main object was the establishment of a permanent sanctuary for the preservation, under natural conditions, of the fast disappearing native fauna and flora. The Promontory is particularly suitable, both as a sanctuary and as a resort for tourists. It is the most southerly portion of Victoria, is almost completely cut off from the mainland, and is quite unsuitable for agricultural settlement.

When the Park was established only about six species of native mammals existed there. These consisted of the common Black-tailed Wallaby, Native Bear or Koala, Echidna, one species of Bandicoot, and Ring-tailed Opossum. Dingoes, Foxes, and Hares were also there, but the former has been completely eradicated. Kangaroos, Wombats, Common Opossums, Emus, Lyre-birds, and many other characteristic Victorian animals were not represented. One of the chief objects of the Committee of Management was to introduce as many of the native animals and plants, not already existing there, as possible. Up to the present three species of Kangaroos, three species of Wallabies, two species of Wombats, three species of Opossums, two species of Bandicoots, Emus,

Lyre-birds, Mallee Hens, two species of Ibis, and Satin Bower-birds have been liberated, and some of these have increased considerably in number.

Regarding the flora, three separate biological surveys have been made, and the results show that more than 600 species of native plants—nearly a fourth of the flora of Victoria—exist in the Park. In addition, 43 species have been introduced, either as seeds or young plants, including the Cabbage-tree Palm.

Since the National Park was established, the Committee of Management has erected two rangers' cottages, a chalet to accommodate up to 30 persons, two rest houses, two campers' huts, a jetty, bridges, and fencing. Tracks have been formed to the various beauty spots, and horses, vehicles and a boat purchased. The Government grant commenced at £200 a year, increased later to £500, then reduced to £300 for four years, and again raised to £500 last year. The costs of erection and general maintenance of all buildings, salaries of rangers, and general maintenance have been borne without any extra Government assistance, and it was only through the increased income derived from the agistment of cattle and by strict economy that the Committee has been able to do so much.

As the natural beauty of the Park becomes known, the number of tourists increases, and the demand for accommodation during the holiday seasons is now so great that large numbers of applications have to be refused. With the increased facilities for reaching the Park by motor, a greatly increased demand is expected.

NOTES ON BUTTERFLIES

During the week spent at the Promontory, the number of butterflies observed was not very great; one reason for this being the weather—consistently dull, with occasional light rains and rarely a burst of sunshine. Six of the 12 species noted were embraced in the large family Nymphalidae the others belonging to Papilionidae (1), Lycaenidae (2), and Hesperidae (3).

Heteronympha solandri was captured almost at the level of the sea. This, the most beautiful of our Satyrids, has not been taken so far south before. During January and February it can be obtained on the summit of Mount Donna Buang (4080 feet), and in January of this year, Mr. F. E. Wilson collected a specimen on the Bogong High Plains (elevation about 6000 feet), so that the same altitude variation is apparent in the butterfly fauna at the Promontory as in the plants. Sassafras, Myrtle-beach, etc., grow around Sealers' Cove at sea-level.

The Common Brown, *Heteronympha merops*, was numerous (females only) on the wing. The males are always earlier. *Xenica klugi*, another Satyrid, and the Painted Lady, *Pyrameis cardui*, were both plentiful. The Wood-brown, *Tisiphone abeona*, always impresses as one of the most graceful of insects in the air. It appears to float, rather than fly, and glides down the gullies, or over one's head, without the slightest perceptible effort. In contrast to the preceding insect, the alert, swift flight of the admiral, *Pyrameis itea*, was striking.

Blues were scarce, only the ubiquitous Common Blue, *Zizina labradus*, and *Candalides acasta*, being taken. The latter is found in Tasmania.

One example of the Swallow-tail family, namely, *Papilio nucleayanus*, was seen. This is the only Papilionid which extends its range into Tasmania, and the only Victorian species possessing a true swallow-tail. A truly beautiful insect, with delicate green and velvet black coloration, it presents a perfect little picture as it hovers, wings quivering, over a flower. Lastly, three Hesperids were noted. *Signeta flammeata* and *Hesperilla idothea*, both common species in the Dandenong Ranges, were numerous, both on the high country about the Saddle, and in the low areas. *Mesodina halyzia*, a rarity in Victoria, frequented only the slopes of the hill on the western side of the Saddle, and the area near the Summit. A quick flyer, like all the skippers, it kept quite low, frequently alighting on the ground. Thirty-six species of moths were taken.

NOTES ON A WAGTAIL AND ITS NEST.

A farmer friend related to me the following incident:—He had a light wagon which had been standing in the stackyard for some time, not being required, when he decided to use it for bringing from Murtoa, eight miles from the farm, a heavier load than usual. He drove in the wagon to town, transacted some business, loaded the wagon, and started on his journey home. When about half-way he had to stop and shift some of the loading, which had got out of place. When on the ground, at the side of the wagon, he was surprised to see a Willie Wagtail, *Rhipidura leucophrys*, which darted at him furiously. Soon the little bird went beneath the wagon, and sat on its nest, which was built on the fetchels. My friend drove on, and when he unloaded the wagon at the farm, the bird was still on its nest. The wagon was placed in its former position. The bird was happy, brought the young ones out, and reared them safely. What love is like a mother's?—JAMES HILL (Murtoa).

CLUB BADGE.—The new Club Badge is now available in three forms—brooch, pendant, and stud for coat lapel, at 2/8 each. Application should be made to the Hon. Treasurer.

EXCURSION TO SEALERS' COVE.

A party of fourteen, including four members of the Walkers' Club, on Boxing Day proceeded by train and horse tram to Port Welshpool, where, embarking on the motor-boat about 3 p.m., they took a course up the Lewis Channel, and then westward past the low-lying and extensive Snake Island to the Eastern Coast of the Promontory. Passing Rabbit Island, a conspicuous detached granite mass, one of the rookeries frequented by countless mutton-birds, the boat, coasting past Five-mile Bay, and rounding a lofty and precipitous, sentinel-like hill, entered Sealers' Cove.

Here a party of picnickers from the vicinity of Welshpool was in camp near the beach. A provisional camp was made, which, on the departure of the visitors next day, was transferred to a permanent one convenient to the hut.

Sealers' Cove is one of several landlocked inlets east of the Promontory, which provide refuge in stress of storm for tempest-tossed vessels. A century ago they were the haunts of sealers and whalers. In 1798 George Bass, on his memorable voyage, spent a week at Sealers' Cove.

The Cove in form is a truncated ellipse, of which the eastern side is open to the sea. Opposite this is a gracefully curving beach of fine, somewhat "musical," sand, extending for about a mile and a half, until beset by lofty granite hills, the Southern one about 850 feet, the Northern about 950 feet in height, with huge rocky buttresses securely protecting the Cove.

Sealers' Creek, a tidal stream draining the watershed, runs almost parallel to the beach, about a quarter of a mile distant before entering the Cove at the southern end. The intervening land, overgrown thickly with scrub, bracken, eucalypts, tea-tree, hazel, *Banksia*, sedges and grasses, has evidently been formed by the combined action of tide and creek, supplemented by wind.

Back for several miles to the enclosing mountain range, rising like an amphitheatre with several peaks over 2,000 feet in height, is a densely forested area, the chief Eucalypts being Bluegum, Stringybark, and Mountain Ash, in association with Blackwood, Lilly-pilly, Blanketwood, Hazel, Musk, Christmas Bush, etc., amid, and underneath which, in moist glades and gullies, is a profusion of ferns—*Dicksonias*, *Alsophilas*, *Cyatheas*, huge *Todeas*, and most of our listed species. For miles

along the rising track from the Creek to the Gap, the luxuriance of embowered fern vegetation, of polypods, mosses, and lichens, is extremely beautiful. Above the divergence of the old tram route from the Sealers' Cove track, the Myrtle-beech grows vigorously. Some fine old trees, begirt with moss and fern, being a pleasing feature of the gully.

During our stay we studied the flora for some miles along this verdurous track, with its fairy-like vistas and rippling water-courses. The sea-front was "combed" for its treasures. The two bold headlands were ascended through the tangle of Banksias, Hakeas, Grass-trees and burnt vegetation along their steep slopes, amid huge granite boulders and rock-strewn surfaces. On the South headland we reached a vantage point giving a charming view of Refuge Cove, and its double strips of sandy beach. Returning, we saw some splendid specimens of King Fern in a steep creek discharging into the mouth of Sealers' Cove. This area, ravaged by fire last year, is rapidly re-clothing itself with verdure.

Messrs. Carter, Dickens, and Ralph made a forced march from the camp *via* the Gap and telegraph track to the Lighthouse, 18 miles distant, returning next day after an interesting trip. Messrs. Hodgson, Carter, and Ralph successfully essayed penetrating the thick scrub to Refuge Cove.

Then we followed the long-abandoned tram route from the Cove track into the heart of the hills, at the foot of Mt. Wilson. This was a strenuous undertaking, the denseness of the scrub of bracken, *Senecio*, rotten hazel-stems, *Acacia*, sword-sedge, nettles, etc., being a great obstacle. A way had constantly to be forced through the tangle, and the elusive track frequently to be *felt* for.

When crossing and re-crossing the stream, great care had to be exercised on the rotting timbers, overgrown with vegetation. Fine fern vegetation occurred where we touched the stream. After three hours' struggling in the close atmosphere and thick undergrowth, we lunched; and then four of the party, persevering, reached some ruined huts, a dismantled landing-stage, and some derelict machinery near the end of the old line. It was evident that all available timber had been cut out from this basin. Our return along the now beaten track was much easier.

Regarding the flora in the area, so effectively sheltered from the prevailing westerly wind and current, and

favoured by aspect and humid conditions, luxuriance and vigorous growth are characteristic. The large-leaf *Pultenaea*, *P. daphnoides*, and Golden Goodia, *G. lotifolia*, showed exceptionally large leaves; the Grass Trigger, plant, *Stylidium graminifolium*, unusual size and deep colouring, sedges and rushes great vigour in growth. *Senecio velleioides* was large-flowered, and in profusion giving the scrub a bright yellow tinge.

The Forest Bind-weed, *Calystegia marginata*, forming close festooning masses on acacias, hazels and gums, strangled growth, sometimes strongly entwining itself to a height of twenty feet. The Common Heath, Purple and the Angled Lobelia, Scented Fan-flower, Kangaroo Apple, Wood Violet, Elder-berry *Panax*, Bladderwort, Christmas Bush, Coast Stackhousia, Coast Tea-tree, Sea-box and Honey-myrtle, were in flower. *Microtis porrifolia*, *Thelymitra aristata*, and another species of Orchid were seen. On the South head it was of interest to find *Eucalyptus Kitsoniana*, of a mallee type, growing 800 feet above sea-level; and also, far away from its recognised habitat, the Omeo Gum, *Eucalyptus neglecta*, in the same vicinity.

In respect to fauna Koalas were fairly numerous, frequenting Blue-gums. Wallabies and foxes were seen, one of the latter at Refuge Cove carrying off several fish from the camp there. Few lizards and no snakes were seen.

Black fish and *Galaxias* are in the Creek and its affluents, and many species came from the sea to the mouth of Sealers' Creek. At Refuge Cove, at which we called whilst returning, we saw some whiting chased close to shore by a barracouta, and a small shoal of "mackerel," with an Oyster-Catcher flying in pursuit. The campers at Refuge Cove were surprised to see a shark arrive on a swelling wave, make a round tour of a large granite rock, and go out on the retiring wave. Two sting-rays, one of large size, were seen near the swimming place at Sealers' Cove, and on two occasions porpoises were disporting themselves.

Birds were not numerous, the Black Cockatoo, Bronzewing Pigeon, Strepera, Black Duck, Black Swan and several smaller birds were noticed, whilst Silver Gulls, Pacific Gulls, and the Skua Gulls were about the shore. Crows were on several occasions seen feeding with gulls on the shore. Much of the pleasure of the members at the camp was due to Mr. Miller's arrangements as head of the commissariat department.—CHAS. DALEY.

"BATTLES LONG AGO."

The accompanying illustration (plate VIII.) depicting a fight between two tribes of aborigines, in the vicinity of the Goulburn River, Victoria, is from one of several oil paintings executed by the late Mrs. A. A. C. Le Souef, and presented to the National Museum by her daughter, Mrs. Otway Falkiner.

Mr. Albert A. C. Le Souef, who was for many years Director of the Melbourne Zoological Gardens, was keenly interested in the habits and customs of the aborigines. In the early days he had exceptional opportunities of associating himself with them, and, having gained their confidence, of witnessing many of their ceremonies.

The description given below of the fight between the Bangarang and Oorilim Tribes, which was witnessed by Mr. Le Souef, in 1842, is taken from his own account, which accompanies the painting.

Both the Bangarang (spelt Pangarang in his notes) and the Oorilim Tribes occupied a large extent of country bordering on the Goulburn River, and the corroboree took place on the present site of Murchison.

NATIVE FIGHT.

"In the year 1842, I witnessed the fight here depicted between the Pangarang and the Oorilim tribes on the lower Goulburn—the latter tribe were encamped on the banks of the Goulburn, not far from the station where I then resided, and had invited the Pangarangs by message-stick to visit them. A number of that tribe arrived one forenoon, and as soon as they had built their miamias, I strolled up to the camp of a man named 'Wigiloptka,' but called Neptune by the whites. I had been told that a fight was likely to take place, as Neptune had recently lost a son, and he suspected his death had been caused by the witchcraft of the Oorilims. Neptune was sitting cross-legged before his fire, roasting an opossum, his two lubras sitting behind him.

"In a few minutes the mother of the dead boy commenced a low mournful dirge, and directly she did so, her husband, who up to that moment had been laughing and talking with me, became grave and silent. The woman gradually worked herself into a rage, cursing the Oorilim for causing the death of her child, and taunting her own people, and her husband in particular, for not avenging his death. Gradually the noise of the camp became hushed, and several other women joined in the

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Plate VIII.



"A Native Fight."

(From the painting by the late Mrs. A. A. C. Le Sueur).

chant for the dead. Neptune, who had sat motionless as a statue until now, suddenly sprang to his legs as if he had received an electric shock, and dashing his opossum cloak to the ground with a wild cry, seized his spears, and rushing into the open space between the two camps, threw a reed spear high into the air. As it fell quivering in front of the Oorilim camp, every man rose and ran to his weapons, and in a minute the two tribes, about thirty men in each, stood opposite to each other.

"The conflict now commenced in earnest, spears and boomerangs whizzed through the air, the men shouted and yelled defiance, while the women of the tribes hung on the outskirts of the combatants, cursing and taunting, lashing the ground with their opossum cloaks and yam sticks, throwing dust into the air, and dancing with rage like very maniacs, as they were for the time. Every now and then they would rush at each other with their long, heavy yam sticks, and smash each other's fingers. The children screamed, the dogs howled, and altogether the uproar of the fight was deafening. After a time, as the rage of the combatants increased, the spears were thrown aside and the men rushed at each other with their war clubs and head shields, and a general hand-to-hand fight took place and lasted for some time, until a third tribe, the Benbedores from the lower Campaspe, who were not mixed up in the quarrel and who were encamped on the opposite side of the river, crossed in their canoes, and rushing in a body unarmed among the belligerents, clasped the fighting men round their waists from behind, and by that means succeeded, with much loud talking, in stopping the fight.

"When peace was restored, I (who had watched the combat from behind a tree) found that no great damage had been done. One man was severely cut in the thigh by a boomerang, two were speared, and a few broken heads made up the sum total of the casualties. Shortly after, the tribes seemed to have forgotten their quarrel, and were again on friendly terms, and on the following night held a grand Corroboree."

Such illustrations and personal notes relating to native tribes long since extinct, are of considerable interest, and are highly valued by the Museum. Doubtless others are still in existence, and it is hoped they will find a permanent resting place among many similar treasures in this institution.—J. A. KERSHAW.

THE AQUATIC PLANTS OF VICTORIA.

Part III.

BY H. B. WILLIAMSON, F.L.S.

Family POTAMOGETONACEAE (contd.).

Genus POTAMOGETON.

(Gk. *potamos*, a river; *geiton*, neighbour.)

Freshwater plants often wholly submerged except the flower spike. The genus belongs to that section of the family which has bisexual flowers in spikes. In these characters it agrees with *Posidonia* and *Ruppia*, but differs from them in having a floral perianth. Flowers, (Fig. 1a), which consist of four segments, are in simple, dense spikes on axillary peduncles. There are four stamens, almost sessile, and four free carpels, which develop into nut-like fruits with an almost lateral beak. (Figs. 1, 2 b.)

KEY TO THE VICTORIAN SPECIES.

- (a) Leaves similar, all submerged, sessile or nearly so
 - (b) Leaves broad, clasping the stem *P. perfoliatus*
 - (b) Leaves narrow, not clasping
 - (c) Leaves lanceolate or linear-lanceolate, 3-nerved, with wavy edges *P. crispus*
 - (c) Leaves flat, linear
 - (d) Leaves without sheathing bases
 - (e) Leaves blunt, many-nerved *P. ochreatus*
 - (e) Leaves pointed *P. acutifolius*
 - (d) Leaves with sheathing bases, narrow-linear *P. pectinatus*
- (a) Leaves dissimilar, upper ones broader and floating
 - (f) Stems long and much branched, leaves all submerged, petioles dilated *P. lucens*
 - (f) Stems unbranched, or branching only at the summit, upper leaves floating
 - (g) Floating leaves translucent *P. australiensis*
 - (g) Floating leaves coriaceous
 - (h) Submerged leaves narrow-lanceolate, quickly decaying, semi-translucent, few-nerved, fruit 3-keeled (tricarinate), 1 line long, stipules deciduous, semi-translucent *P. tricarinatus*
 - (h) Submerged leaves broad, oval, thin, but not semi-translucent, many-nerved, fruit tricarinate, 2 lines long, stipules deciduous, almost opaque, conspicuously streaked *P. sulcatus*

POTAMOGETON PERFOLIATUS, L. Perfoliate Pondweed.
(Fig. 1.), Tas., Vic., N.S.W., E., As., Af., Am.

This species is easily recognised by its having leaves thin, ovate and perfoliate (clasping the stem which appears to pierce the leaf) about $1\frac{1}{2}$ inches in length, and 1 inch in width, with about 12 parallel veins. Stems are long, sometimes 5 yards, much branched, and leaves at the upper end are somewhat crowded, provided with thin stipules on the younger branches. Flower spikes are rarely an inch long, and may contain as many as 20 flowers. It has been recorded from the S.W. (Merri River, Warrnambool, H.B.W.) and the East (Gippsland Lakes) of the State.

One of the forms found in the Tambo River, Mueller, with longer and narrower leaves, not amply clasping, has been placed as var. *Muelleri*, by A. Bennett. It was labelled "*P. praelongus*," by Mueller.

POTAMOGETON CRISPUS, L. Curly Pondweed. (Fig. 2.)
All but W.A. and Tas. All continents.

A smaller plant, with thin leaves mostly 1 inch in length, and $\frac{1}{4}$ inch in width, rounded at the end, with wavy margins, the edges minutely toothed, distinctly 3-veined (2a). Beak of the fruit quite prominent. In streams and lagoons in many parts of the State.

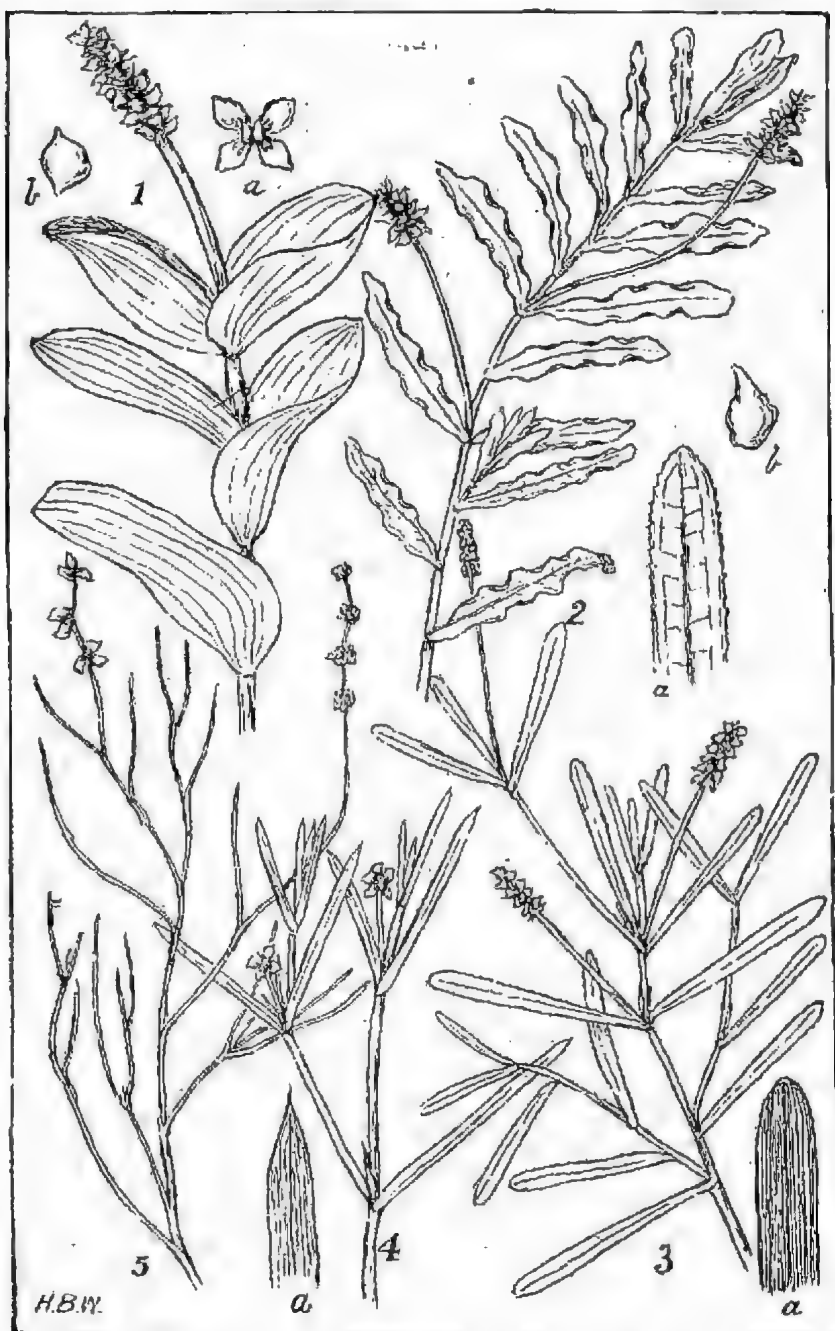
POTAMOGETON OCHREATUS, Raoul (*P. obtusifolius*, Mert. & Koch), Blunt Pondweed. (Fig. 3.) All the States and all continents.

A much commoner plant, distinguished from *P. crispus* by its longer, linear, flat leaves with no minute teeth, and with many fine parallel veins (3a). Widespread through all parts of the State.

POTAMOGETON ACUTIFOLIUS, Link. Sharp Pondweed,
(Fig. 4.) S.A., Vic., N.S.W., E. As.

This is distinguished from *P. ochreatus* by its leaves being narrower, thinner and quite sharp pointed. (4a.) Its spikes are apparently few-flowered. It is recorded for Victoria from a specimen collected by Mueller about 60 years ago in the "Murray River," whether "Upper" or "Lower" is not known.

POTAMOGETON PECTINATUS, L. Fennel Pondweed. (Fig. 5.) S.A., Tas., Vic., N.S.W.



1, *Potamogeton perfoliatus*. 2, *P. crispus*. 3, *P. ochreatus*.
4, *P. acutifolius*. 5, *P. pectinatus*.

A plant with the habit of *Ruppia* and *Althenia*, having narrow, linear leaves, all submerged, 2 inches to 3 inches in length, and up to 1 line in width. The plant is placed in a section by itself on account of the long, sheathing bases of the leaves, bearing at their summit a pair of membranous stipules. All others of the genus have no sheaths, but conspicuous stipules, from the base of which the leaves arise. Flower spikes are on filiform peduncles, one or two inches in length, and consist of three or four clusters of flowers. In creeks and lagoons from the Yarra to Portland, not rare.

POTAMOGETON LUCENS, L. Shining Pondweed. Doubtful for Australia. All other continents.

A plant with all its leaves submerged, up to 10 inches in length and 2 inches in width, lanceolate, often undulate, lower ones rather distant, all pale-green, shining. Stipules up to 3 inches in length. Spikes about 3 inches long, on peduncles 6 or 7 inches long. This species has been recorded from the "Tambo River, F. Mueller," A. Bennett, in "Journal of Botany," XXV. (1887), 177, but the specimens cannot now be traced. The plant recorded from the National Park (Darby River), J. W. Audas, 1910, is not *P. lucens*.

POTAMOGETON AUSTRALIENSIS, A. Bennett. (*P. coloratus*, Vahl., var. *jamaicensis*, Grieseb.) Thin Pondweed.

This is the plant collected in the Barwon River by J. Bracebridge Wilson, and placed by Mueller under *P. plantaginens*, one of the synonyms of *P. coloratus*. In 1887 it was raised to the rank of a species by A. Bennett, "Journ. of Bot." XXV., 177.

Submerged leaves are about 4 inches in length, and 1 inch in width, on petioles nearly an inch long, lanceolate, pointed, and distinctly translucent. Floating leaves ovate on shorter petioles rounded at the base, rather blunt. Stipules about 1 inch long, longer than the petioles. Spikes slender.

Other species recognised by Mueller in his "Key" or his "Census of Australian Plants" are *P. natans*, L., and *P. tricarinatus*. With regard to the former, Graebner, in Engler's Pflanzenreich, has shown that *P. natans* does not occur in Australia. It differs from *P. tricarinatus* in not having 3-keeled fruits, and in its narrow, almost thread-like submerged leaves. It seems certain that our commonest species, which has floating leaves, is

tricarinatus, F.v.M., a robust plant, with thick, ovate, floating leaves, and thin, broad-linear or narrow-lanceolate submerged leaves which, being deciduous at flowering time, are often absent from herbarium specimens. Its fruits are distinctly tricarinate. Its close allies are *P. sulcatus*, with submerged leaves never linear, but ovate, thinner than the floating leaves, and *P. Tepperi*, A. Bennett. Both these species, and even the allied *P. polygonifolius*, may be found to occur in Victoria.

There is one authentic specimen of *P. sulcatus* (seen by Bennett) from the Lower Murray, and it is likely that this species is more common than is apparent so far.

More cannot be said about these rather confused forms until reference has been made to the British collection at Kew.

Collectors are reminded that for safe determination of species of this group, it is essential to obtain a fair length of stem showing submerged leaves.

Family SCHEUCHZERIACEÆ.

A small family of marsh plants containing five genera, four of which contain one species only. One of the latter occurs in Australia (Queensland and New South Wales). The other genus, *Triglochin*, contains 14 species, seven of which are found in Victoria.

Genus TRIGLOCHIN.

(Gk. *treis*, three; *glokhis*, a point.)

Flowers bisexual, perianth segments 6, herbaceous, shell-shaped. Stamens 6, or fewer by abortion. Anthers sessile. Carpels 6, usually only 3 fertilised. Marsh plants, sometimes wholly submerged.

KEY TO THE VICTORIAN SPECIES.

- (a) Fruits of three nutlets falling free from the central axis or from the sterile carpels. Perennial aquatic plant about 3 feet long. *T. procera*
- (a) Fruits of 3 or 6 nutlets adhering to a central axis
 - (b) Perennial marsh plant 3 inches to 1 foot in height. *T. striata*
 - (b) Annual plants less than 3 inches in height
 - (c) Carpels united only at the base, the three fertile ones with a reflexed point. *T. mucronata*
 - (c) Carpels united to the apex, no reflexed point
 - (d) Carpels with well developed incurved basal spurs. *T. calcitrapa*
 - (d) Carpels with short basal spurs, not incurved

- (e) Fruit pyramidal with a conical apex *T. turrifera*
- (e) Fruit linear of linear-pyramidal
- (f) Spurs small *T. centrocarpa*
- (f) No spurs, fruit sessile, minute *T. minutissima*

TRIGLOCHIN PROCERA, R.Br. Water-ribbons. (Fig. 1.)
Confined to Australia, all States.

In running water this plant is very common, the long, ribbon-like leaves about $\frac{1}{2}$ inch in width often floating for several feet on or near the surface. Flower peduncles are thick, and emerge bearing a dense spike sometimes a foot long. Flowers about $\frac{1}{4}$ inch long. Perianth segments ovate. Stamens 6. Anthers sessile. Fruit almost globular. Fruitlets 6, or by abortion fewer, often more or less spirally twisted (1a.) Fig. 1 shows a fruiting spike with some of the fruits fallen off. Common in all parts of the State.

TRIGLOCHIN STRIATA, Ruis. and Pav. Streaked Arrow grass. (Fig. 2.) Australia, all States, Am., N.Z.

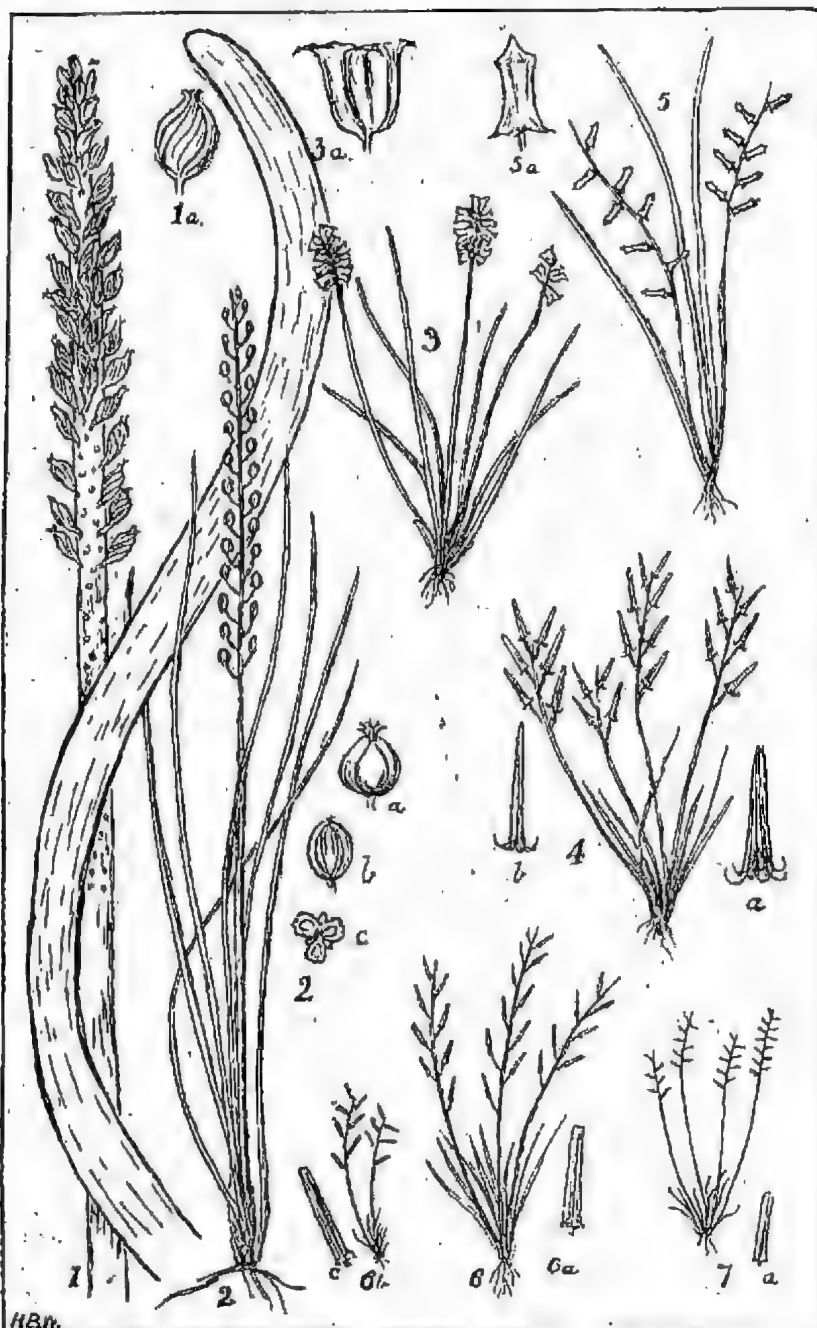
A perennial, swamp plant, with basal, narrow-linear leaves and slender flowers, stems from 1 inch to 1 foot high (usually 5 inches), bearing numerous flowers on curved pedicels. Fruit almost globular, with three fertile carpels streaked on the back. 2a, flower; 2b, fruit; 2c, cross section of fruit. Recorded from all districts except the N.E.

TRIGLOCHIN MUCRONATA, R.Br. Prickly Arrowgrass. (Fig. 3.) Confined to Australia (W.A., S.A., Vic.),

A tufted annual to 4 inches high. Leaves all basal, flaccid. Flowers few, sometimes only one to the scape. Fruits sessile, top-shaped. Perfect carpels 3, each with a short beak pointing outwards. Recorded from saline flats at Geelong, Mt. Abrupt, and the Wimmera.

TRIGLOCHIN CALCITRAPA, Hk. Spurred Arrowgrass. (Fig. 4.) Confined to Australia, all States except Tasmania.

A small tufted annual, with filiform leaves up to 4 inches. Fruits linear-pyramidal, about $\frac{1}{2}$ inch long, each carpel bearing two long, incurved basal spurs. Fig. 4a fruit, 4b a single carpel. Recorded from the North-west only; Wimmera, F. Reader; Mildura, H.B.W.



1, *Triglochin procera*. 2, *T. striata*. 3, *T. mucronata*.
 4, *T. calcitrapa*. 5, *T. turrifera*. 6, *T. centrocarpa*.
 7, *T. minutissima*.

TRIGLOCHIN TURRIFERA (Luehm.) Ewart. Turret Arrowgrass. (Fig. 5.) Confined to Australia (W.A. and Vic.).

This differs from *T. calcitrapa* by its linear, flaccid leaves, and the remarkable shape of the fruit, a short pyramid with an abruptly-set cone as an apex instead of being evenly tapered from base to apex. Also the spurs are short, and not recurved. From the N.W. district only. Taylor's Creek, Eckert; Little Desert, F. Reader.

TRIGLOCHIN CENTROCARPA, Hk. Dwarf Arrowgrass. (Fig. 6.) (incl. *T. nana*, F.v.M., Fig. 6b.) Confined to Australia, all States.

A small tufted annual from 1 inch to 3 inches in height, much resembling *T. calcitrapa*, except that the carpels have the basal spur short and straight, not incurved. Buchenau, in his monograph of the genus (1903), in Engler's *Pflanzenreich*, keeps Mueller's *T. nana* as a distinct species on account of the difference in size of the fruits, and the varying length of stalk, but Ostenfeld, in his "Contributions to the Botany of West Australia" (1918) unites these forms, agreeing with Bentham (Fl. Aust.) that it is impossible to find a line of demarcation among the intermediates. Ostenfeld describes the plant thus:—"Small to medium (3-11cm.) leaves setaceous, filiform, much shorter than the scapes, flowers 4-25, sessile or stalked; fruits erect to erect-patent, pyramidal-linear to shortly linear 2-4 (rarely 5.5) mm. long; carpels slightly dilated at the base, with very short basal (not curved) spurs and bluntly keeled or rounded back." Recorded from all districts except N.E.

TRIGLOCHIN MINUTISSIMA, F.v.M. Tiny Arrowgrass. (Fig. 7.) (Confined to Australia (Vic. and W.A.).

This was included by Bentham under *T. centrocarpa*, but both Buchenau and Ostenfeld agree in keeping them as separate species. It is a very small tufted annual; with filiform leaves and flower stems, rarely reaching more than an inch in height. Flowers 4-11, somewhat distant on the spike. Fruits not more than one-sixteenth inch long, sessile, spreading linear, with a very minute projection at the base of the carpel. Recorded from the South and East of the State—Brighton, Lara, Sperm Whale Head.

THE COMMON THRIPS.

BY REGINALD KELLY, F.E.S.

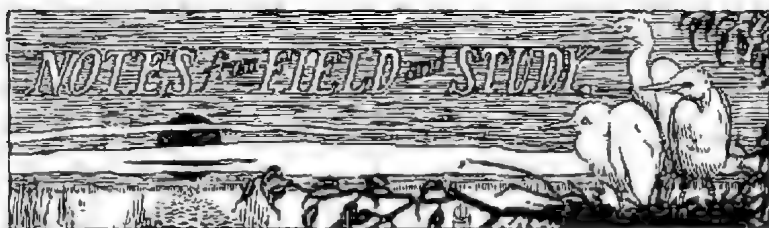
A certain amount of confusion exists concerning the identity of the Thrips, common in our gardens and orchards, which was so destructive in 1926. The insect responsible was thought to be *Thrips tabaci*, Lind., but recent investigations have proved that this species does not occur in Victoria, the damage being caused by an entirely indigenous species, *T. imaginis*, Bagnall. This species was described by Bagnall in 1926 (*Ann. Mag. Nat. Hist.* (9) XVIII, p. III.) from material submitted in 1914.

I acquired the mounted collection of the late Mr. J. Booth, and sent these to Mr. Dudley Moulton, of San Francisco. All the specimens of the genus *Thrips* collected by Booth, from various parts of Victoria and from many plants, were identified by Moulton as *T. imaginis*. During the prevalence of the thrip pest in 1926, I sent many specimens to Bagnall, and also to the British Museum, where they were identified by Mr. Laing and Mr. Morrison as *T. imaginis*. Similarly, I sent numbers to Dr. Karny, of Buitenzorg, Java; Dr. Priesner, of Linz, Austria; Mr. Moulton, and Mr. A. A. Girault, of the Queensland Entomological Department. These insects were all identified as *T. imaginis*, and not one specimen of *T. tabaci* was found among them.

Bagnall, out of the vast material sent to him from Australia, has identified as *T. tabaci* one female from Fremantle, West Australia, and some females from Mt. Lofty, South Australia, sent by Prof. Poulton, and two females, sent by me, from Launceston, Tasmania; but, so far, none from Victoria. All these are referable to the dark variety, *T. tabaci*, var. *pullus*. As distinguished from this form, some of the females of *T. imaginis* have the abdominal segments 9 and 10 noticeably darker than the rest, and are referable to *T. imaginis*, var. *apicalis*.

Dr. R. J. Tillyard, in his work, "Insects of Australia and New Zealand," gives the number of Australian species in the Sub-order *Terebrantia* as 18, and New Zealand, none, whereas at least 69 species are indigenous to Australia, and one to New Zealand. The same disparity of reference applies to the Sub-order *Tubulifera*.

It is worthy of note that *T. tabaci* was originally described as the "tobacco-thrips," whereas the insect infesting that plant turned out to be *Euthrips fuscus*, Hinds. The interesting conclusion is that the orchardist's pest is an indigenous one, and not introduced.



A STICK INSECT INCIDENT.

At the October meeting of the Club I exhibited a living Stick Insect, *Cyphocrania*, sp., which had been found on a cherry tree in a garden near here. It was about 5 inches in length, and did not appear to be fully grown. The morning after the meeting, I released it on a cherry tree in my garden. It immediately commenced to feed on the leaves, and appeared to be contented, remaining close by all day, notwithstanding the proximity of several medium-sized eucalypts, its supposed food-tree.

The next morning (Wednesday) it was still there, with two others in its company! These were smaller, and, I judge, were males; and each had lost one of its front legs, in one case the left, in the other the right. The three insects remained on the cherry tree all day, but disappeared before next morning.

Stick insects are considered to be rare, and their occurrence has recently been mentioned in the newspapers. May not the rarity be attributed to their habitat being out of sight among the young leaves of gum-trees (eucalypts). The question arises, by what means did my specimen attract the others; or how did they become aware of its presence?—F. G. A. BARNARD.

CONCERNING THE KATIPO.

Recently the Katipo, or Red-backed Spider, has been widely discussed, as a menace to man. Two deaths, believed to have been due to Katipo bites, have been reported. In a letter to the Editor, Mr. Charles French, Senr., says:—

"I know this spider well, having collected lots of specimens for Sir Baldwin Spencer, when he had charge of the Biological Department at the Melbourne University. I have also been present when my friend, the late Chas. Frost, of our Club, was conducting experiments with the Katipo. The late Dr. Godfrey Howitt, Senr., told me that a girl servant at Barker's Station, Cape Schanck, was fatally bitten, and this is the only authentic case which has come under my notice. It occurred over 50 years ago.

"Two cases of very severe after results of bites have been under my notice—one of the victims was a lady in the Benalla district; the other, a publican then living at Harriettville. The former was ill for months. The man had to lay-up for nearly three months (so he told me himself), in the Beechworth Hospital, but eventually, and after suffering agony, he recovered. Mr. Frost handled these spiders with impunity, and always contended that, although their bite killed mice and chickens, the result to human beings was unlikely to be fatal. I have always taken an interest in the Katipo, as it was fairly common at Cheltenham when I lived there. We found them in the stacks of empty flower-pots; but owing to some instinct, I suppose, no one handled them."

THE CICADA NYMPH.

The primary object of this note is to correct a statement made in my paper entitled, "Hatching Process of Cicada," in the November *Naturalist*. I noted that the tarsus of the digging fore-leg in the fully-grown larva or nymph was absent. This was a mistake, owing to my having examined imperfect specimens. The tarsus of the fore-leg in the fully-grown nymph is single-jointed, carries a pair of claws, and is articulated to the tibia some distance from its tip and on its inner aspect. It is thin and slender, and is much less highly chitinized than the tibia, and consequently is very easily broken off in preserved specimens.

Of Australian forms of Cicada, the complete life history is generally considered to occupy from three to five years, or perhaps more. In America a great amount of work has been carried out on some of the species, such as the 17-year-old and the 13-year-old Cicadas, and interesting details are brought out by C. L. Marlatt, in a paper, entitled "The Periodical Cicada," in the United States Department of Agriculture, Bureau of Entomology, *Bulletin* 71, 1907. In the section on the underground life of the Cicada, the history of the larval and pupal stages is given from experiments in a successful 17-year breeding record. "A careful study of the material collected in the course of the experiments demonstrates the interesting fact that this species, in spite of its very long period of growth, presents the same number of adolescent stages as is found in insects which go through their entire development within a single year, or even of the more rapidly multiplying species which have many annual generations. But six distinct stages are found, four of which belong to the larval condition, and two to the pupal. In other words, the larval and pupal changes in the periodical Cicada are normal, and are not increased by its long preparatory existence." The pupal stages referred to are those in which wing pads are developing and where sexual differences are becoming discernible.

A remarkable fact is mentioned by Marlatt with reference to the tarsus of the fore-leg. During the long subterranean life "the long slender tarsi, being distinctly in the way in digging in the earth and of no service, become rudimentary with the first moult, and nearly disappear in the subsequent larval stage. They reappear in the first pupal stage, but in this and the subsequent pupal stage, while the insect is still below the soil, they are folded back along the tibiae, so as to be practically functionless, and are only unfolded and brought into service after the pupa has emerged from the ground."—JANET W. RAFF.

TORTOISES IN MELBOURNE GARDENS.

There are several Murray Tortoises, *Emydura macquariae*, in the ponds of the Queen Victoria Gardens. Noticing one swimming close to the bank, I threw in some prawn-heads, which were soon picked up. In feeding, the tortoise held the prawn-head in its jaws by one end, and placing a foot on the other end and pressing against the bottom of the pond, with a jerk of the neck broke the food into pieces of a convenient size for mastication. During this operation, numerous carp fry crowded around to pick up the fragments, but the tortoise took no notice of them. A larger tortoise coming up, attacked the first one, and drove it away. It is improbable that these slow-moving chelonians can catch the quick-swimming fishes, although they would devour dead ones.—A.E.R.

A LARGE FUNGUS.

The recent rains, extraordinary for the time of year, have probably been responsible for the numerous fungi (mushrooms included) which have appeared in various places. When driving along a road at East Ringwood one day early in February, I was astonished at a group of large fungi which had sprung up underneath some medium-sized eucalypts (probably Apple Box, *E. Stuartiana*, F.v.M.) by the roadside. There were quite 20 of them. On alighting further to investigate the occurrence, I was so impressed by the immense size of the largest plant that I collected it, to exhibit at the Club meeting.

It is a *Boletus*, and seems to agree with the description of *B. portentosus*, B. and Br., in Cook's *Handbook of Australian Fungi* (p. 107). Singularly enough, this species also occurs in Ceylon. The pileus is very thick, the surface russet-coloured, somewhat depressed in the centre; the flesh is lemon-yellow, while the spore-tubes are dark brown. The stem is short and thick, nearly 6 inches in diameter, and is much dilated at the base. The fungus measures just 60 inches in circumference, and weighs no less than 7 lbs.—A. E. OPPENMAN.

MOUNTAIN GRASSHOPPERS.

Usually met with singly or in pairs, the Mountain Grasshopper, *Acridopeza reticulata*, recently appeared in thousands in the Hamilton district. A correspondent, who forwarded specimens, stated that the insects had not previously been seen in the district for many years.

This species is one of the most remarkable of all Grasshoppers. The apterous female has shell-like elytra, which she raises when disturbed, revealing a plump, red, white, and blue body. It has been suggested that the object is to startle an enemy. I made numerous experiments with different specimens, and the result was ever the same. The least touch caused the Grasshopper to raise its wing-covers; but sometimes they were lifted only slightly. *Acridopeza* was found on Mount Feathertop at an altitude of about 5,000 feet. Doubtless it is a mountain-lover, but it occurs also on the lowlands. Down Hamilton way, it was taken among stones and bracken.—C.B.

FLYCATCHER AND DRAGONFLIES.

Early last summer, when dragonflies were hovering over the placid surface of the river, in hundreds, I noticed, in the Restless Flycatcher, *Seisura biqueta*, a trait previously unknown to me. One of these birds was perched on an over-hanging branch of a gum-tree, from which it flew at intervals, to catch insects. Suddenly it swooped into the midst of a lot of dragonflies—catching two in its feet—not using the beak as it had done in capturing other insects.

With the two dragonflies, which were rather large, the bird flew towards the bank, one of the insects escaping on route. Calmly alighting within a yard of where I was standing, the bird stripped the insect of its wings and legs, ate them, and then swallowed the body whole—head first. Is it usual for these small birds to eat such large insects, and to catch them by such methods?—EVELYN LYLE.

EXCURSION TO PHILLIP ISLAND.

Fourteen members took part in the excursion to Phillip Island, extending from January 28th to 30th. On Saturday afternoon, we walked a mile or two along the Main Road, and were much interested in the Koalas, a number of which were observed in the Eucalypts, growing in the adjoining paddocks. Two of these animals frequented the trees in the yard of our guest-house.

In the evening, we strolled along the "Lover's Walk," a picturesque and sequestered footway through the Coastal Tea-tree, *Leptospermum laevigatum*, fringing the shore. Many large Banksias and Melaleucas were noted, together with Casuarinas, and bushes of Sweet Bursaria, *B. spinosa*, and Coastal Beard-heath, *Leucopogon Richei*. In a clump of Tea-tree, three young Boobook Owls, *Ninox boobook*, were discovered, while the piping of a Yellow Robin, *Eopsaltria australis*, and the raucous notes of a Red Wattle-bird, *Anthochaera carunculata*, were heard.

The Nobbies, at the western extremity of the Island, was the rendezvous for Sunday. Several Koalas were seen perched in forks of the Eucalypts along the road close to the township, and some were feasting on the gum-leaves, when we returned towards evening. The Nobbies was ascended by a steep foot-track during low tide, and Seal Rocks, some half-mile off the point, were viewed. Several young Penguins, *Eudyptula minor*, were found in their nesting burrows, which usually consist of a tunnel about 3 feet or 4 feet in length, with an opening at each end. Small Pigface, *Mosembryanthemum tegens*, and the Cushion-bush, *Calocephalus Brownii*, constituted practically the only vegetation.

A visit was paid to the Blowhole, a cave-like excavation in the cliff, which, at, high tide, emits an intermittent roaring. The party then walked along the north coast to Cowry Beach, inspecting a small Mutton-bird rookery on the way; while some time was spent raking over a number of kitchen middens, but only a few quartz and flint chippings, and a broken grinding-stone, were picked up. Among the birds noted during this outing may be mentioned the White-backed Magpie, *Gymnorhina hypoleuca*; Kookaburra, *Dacelo gigas*; White-fronted Chat, *Epthianura albifrons*; Spur-winged Plover, *Lobibyx novae-hollandiae*; Goldfinch, *Carduelis carduelis*; Butcher-bird, *Cracticus destructor*; Magpie-lark, *Grallina cyanoleuca*; Sparrow-hawk, *Accipiter cirrocephalus*; Harmonious Shrike-Thrush, *Colluricincla harmonica*; Red Wattle-bird, *Anthochaera carunculata*; and the ubiquitous Starling, *Sturnus vulgaris*.

Monday was devoted to a motor boat trip to Cape Woolamai. The sand drifts are encroaching on the rookeries, and we were impressed with the seriousness of this menace. A Horsefield's Bush-lark, *Mirafra javanica*, and a Nankeen Kestrel, *Falco cenchroides*, were noted on the Cape, in addition to one or two isolated Mutton-birds, *Puffinus tenuirostris*. Many sea-birds were to be seen on the mud flats near Newhaven and Rhyll, including Black Swans, *Chenopsis atrata*; White-necked Herons, *Notophox pacifica*; Eastern Curlews, *Numenius cyanopus*; Sand-pipers, *Tringa hypoleuca*; White-breasted Cormorants, *Phalacrocorax fuscescens*; Silver Gulls, *Larus novae-hollandiae*; Pacific Gulls, *Gabianus pacificus*; Gannets, *Sula serrator*; and Terns.—V. H. MILLER, L. L. HADGSON.

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THE FIELD NATURALISTS' CLUB OF VICTORIA.

The ordinary monthly meeting of the Club was held in the Royal Society's Hall, Victoria-street, Melbourne, on Monday, March 12, 1928. The President, Mr. E. E. Pescott, F.L.S., occupied the chair, and there were about 120 members and visitors present.

CORRESPONDENCE.

From Mrs. E. Waite, of Adelaide, thanking the Club for expressions of sympathy relative to the death of her husband.

From Mr. William Lawford, of Benalla, offering to donate to the Club a complete set of Mathew's "Birds of Australia," in 12 volumes, on the recommendation of Mr. Donald Macdonald. It was decided that a letter of acceptance and thanks be written to Mr. Lawford, and also that a letter of appreciation be sent to Mr. Donald Macdonald for his interest in the matter.

REPORTS.

Reports of excursions were given as follow;—Dredging Excursion, Dr. H. Flecker; Botanic Gardens, Mr. F. Pitcher; and Black Rock, Miss J. Raff, M.Sc., F.E.S.

ELECTION OF MEMBERS.

The following were duly elected on a show of hands:—As Ordinary Member:—Mr. Andrew R. Wall, 14 Darling-road, East Malvern. As Country Member:—Mr. Jack Kubeil, Kirkland-street, Euroa; and as Associate Member:—Master Neil Douglas, 27 Barclay-street, North Brighton.

GENERAL.

Mr. A. S. Kenyon announced that a meeting of the Ethnological Section would be held in the Royal Society's Hall, on Monday evening, March 19, at which Mr. W. H. Gill would read a paper on "Initiation Ceremonies of Central Australia."

Mr. Kenyon also referred to the issue, by the Numismatic Society, of a medal to commemorate the flight of Mr. Bert Hinkler, from England to Australia.

The President reported that, at a meeting of representatives of the various bodies interested in the proposal to form an Advisory Council on Native Fauna and Flora, an Executive Committee of six had been elected; Dr. J. A. Leach was appointed as Chairman, and himself as Treasurer.

The President referred to the early departure of Miss F. Smith on a visit to England, and wished her bon voyage on behalf of members.

Attention was drawn by the President to Mr. R. H. Croll's book, "The Open Road in Victoria," just published. It would be of considerable interest to members.

PAPERS, ETC.

Mr. J. H. Harvey, F.R.V.I.A., read a paper dealing with the flora and other characteristic features of the West Coast of Tasmania. The paper was illustrated by an interesting series of lantern views, depicting the scenic beauty of the locality.

EXHIBITS.

By Mr. J. Searle.—Sea-Dragon (*Parapegusus*, sp.), Pipe-fishes (*Sephanostoma* and *Syngnathus*), Cow-fish, and Cobbler (*Centropogon australis*). Also Crustacea:—(a) Hermit Crab (in shell); (b) *Serolis*, Sp., an Isopod resembling a Trilobite; (c) *Ibla quadrivalvis*, with peduncles 3 inches in length. A Cirripede remarkable for the fact that the hermaphrodite female is accompanied by a parasitic complementary male—spermatozoa and ova, and the parasitic male occurring in a single individual; also Parasitic male dissected out, and microscopical mounts of the ova, spermatozoa and complementary male of *Ibla quadrivalvis*. (d) Marine worms (*Terebellidae*, *Nereis*, etc.). All collected on Dredging Excursion on 3/3/1928.

By Mr. F. Chapman, A.L.S., F.G.S.—Specimens of Apple-berry (*Billardiera scandens*) and *Casuarina stricta* (male), cultivated at Balwyn.

By Mr. D. Blair.—"Parson's Bands" Orchids (*Eriochilus autumnalis*), from foot of Arthur's Seat, Dromana,

By Mr. A. S. Kenyon.—A series of phyllodes of *Acacia melanoxylon*, showing transition from true pinnate leaves to phyllodes.

By Mr. H. B. Williamson, F.L.S.—Specimens of *Potamogeton* and *Triglochin*, illustrating Part III. of his "Aquatic Plants of Victoria," in *March Naturalist*.

By Mr. H. McColl.—Specimens of *Eucalyptus leucosylon rosea*, and Scarlet Bottlebrush (*Callistemon lanceolata*), cultivated at Kew.

By Mr. F. G. A. Barnard.—Dwarf form of Kangaroo-Fern (*Polypodium pustulatum*), grown in pot for about 20 years.

By Mr. E. E. Pescott, F.L.S.—(1) Eucalyptus root moulded by crevices in Dacite rock, from Marcondah Dam, Healesville; (2) European snails, small species, an increasing and damaging garden pest; (3) hybrid fruit, between common gourd and canteloupe (4) slicing of conglomerate rock, from glacial region, near Mt. Lyell, Queenstown, Tas.; (5) living Blue-tongue Lizard, about 3 years old.

By Miss E. Powles.—Common garden snail, attacked and killed by fungus.

By Mr. A. E. Opperman.—Bunch of common Heath (*Epacris impressa*), from South Warrandyte; very early occurrence.

EXCURSION TO BOTANIC GARDENS.

The excursion set down for February 25th, was postponed to March 3rd. The Leader, who joined the staff at the Gardens as office boy and messenger in January, 1869, took the party to various points of interest on the western portion of the Gardens, and related incidents regarding the changes from their past condition to their state to-day. With a plan showing the "lay-out" of the Gardens in 1873, which the leader explained, and plans of a copy of recent date, which were handed to members of the party, through the courtesy of Mr. Rae, the present Director, one was able to trace the transition work, and relate interesting information in regard to the progress of improvements which have brought the Melbourne Botanic Gardens into the pride of place as one of the finest in the world. We finished our journey about 5 p.m. at the Lily Lake at the top or south end of the Fern Gully. This was the last area so remodelled, from having been, in 1873, a nursery for the raising of trees and shrubs for distribution to country councils, church and school grounds and public institutions, for street and other plantations.—F. PITCHER.

DREDGING EXCURSION.

The dredging excursion, which was to have been held on February 18th, had to be postponed, owing to violent weather, until March 3rd. We left in a sailing boat from the Town Pier, at Port Melbourne. Unfortunately the tow net was lost at the very outset, but about half a dozen hauls from the dredge brought up a large variety of marine organisms, including several species of pipe-fish, sea-horse, cow-fish, leather-jackets, blennies, cobbler, etc. The crustacea were represented by some crabs, including hermit-crabs, inhabiting shells of *Nassarius fasciata*, a king crab, and some Iblas. Large starfishes, and many varieties of molluscs, including a small particularly beautiful orange-colored octopus, covered with very brilliant turquoise spots, were obtained; also worms. A sudden squall compelled an abrupt abandonment of dredging operations. Thanks are especially due to Dr. Wishart for the boating arrangements and also to Mr. Searle, for the loan of the dredging gear.—H. FLECKER.

THE AQUATIC PLANTS OF VICTORIA.

Part IV.

BY H. B. WILLIAMSON, F.L.S.

Class 2, DICOTYLEDONS.

Family HALORRHAGIDACEAE.

Genus MYRIOPHYLLUM.

Aquatic plants with their submerged leaves, usually divided into narrow segments. It may be noted here that as a general rule submerged leaves take that character, thus presenting a greater surface to the water, which supplies them with the necessary oxygen for respiration. Flowers often unisexual, upper ones sometimes bisexual. Male flowers with four petals and four shorter sepals, and four or eight stamens. Female flowers with no petals. Fruits with four united fruitlets sessile in the axils.

KEY TO THE SPECIES.

- (a) Very small plant rarely exceeding 1 inch in height, with entire alternate leaves *M. integrifolium*;
- (a) Plants widely spreading, with opposite or whorled leaves
 - (b) Leaves all opposite and entire
 - (c) Leaves obovate or spatulate *M. amphibium*;
 - (c) Leaves all linear *M. pedunculatum*;
 - (b) Leaves all whorled
 - (d) Upper leaves broad, lower ones capillary
 - (e) Upper leaves entire or slightly toothed *M. elatinoide*s
 - (c) Upper leaves lobed *M. verrucosum*
 - (d) Upper leaves, narrow as well as the lower ones *M. propinquum*
- (b) Leaves simply opposite, lowest in whorls of three *M. Muellerei*

MYRIOPHYLLUM INTEGRIFOLIUM, Hk. f. Small Water-milfoil. Fig. 1. Confined to Australia (All States but Qld.).

An annual herb up to about an inch in height, growing in inundated depressions. Leaves alternate or nearly opposite, linear, pointed, less than $\frac{1}{2}$ inch in length. Fruit 4-lobed, reddish. Associated with this plant may often be found species of *Triglochin*, *Brizula*, *Centrolepis*, and sometimes the rarer *Trithuria*. It has been recorded from all districts except the North-East.

MYRIOPHYLLUM AMPHIBIUM, Labill. Broad-leaf Milfoil.

Fig. 2. Australia only (W.A., S.A., T., V.).

A widely-creeping plant in shallow springs or water courses. It is known by its opposite, entire, spatulate or obovate leaves, often of a reddish tint. Upper flowers

are bisexual, with long filaments and drooping petals (2 b). Lower flowers female, without petals (2 a). Recorded from Curdie River, Gellibrand River, Nat. Park Wilson's Prom., Bunyip.

MYRIOPHYLLUM PEDUNCULATUM, Hk. f. Stalked Water-milfoil. Fig. 3. Aust. (W.A., S.A., T., V.), and N.Z.

Closely allied to *M. amphibium*, perhaps only a variety according to Bentham, differing only in its linear leaves and its somewhat rougher fruitlets. Male flowers are sometimes, but not always, short stalked. Recorded only from Cobberas, Alps, Baw Baws (Mueller), and Nat. Park, Wilson's Prom.

MYRIOPHYLLUM ELATINOIDES, Gaud. Coarse Water-milfoil. Fig. 4. N.Z. and Aust. (W.A., S.A., T., V.), also N. & S. America.

A very common submerged plant, with branches up to 3 or 4 feet long, often forming tangled masses, and becoming a pest in garden ponds. Its submerged leaves are in whorls, and are much divided into capillary segments. Upper emerging leaves are quite different, being in whorls of from 4 to 6, short, broad and almost entire (4 a). It has been recorded from all districts.

MYRIOPHYLLUM VERRUCOSUM, Lindl. Red Water-milfoil. Fig. 5. Aust. only (All States but Tas.).

This resembles *M. elatinoides* in miniature, with finer submerged leaves, and its emerging leaves broad and distinctly lobed, almost pinnate, and often of a reddish colour. All districts but North-East.

MYRIOPHYLLUM PROPINQUUM, A. Cunn. (*M. variaefolium*, Hk.). Common Water-milfoil. Fig. 6. N.Z. and all States of Australia.

Stems simple, ascending, often stout, with all leaves whorled, the submerged ones usually pinnate into capillary segments, the upper ones gradually short-lobed or merely denticulate. The species varies a good deal. The author's Hawkesdale specimens have simple, linear, whorled leaves, except one or two small pinnate ones at the roots. Very common in all parts of the State.

MYRIOPHYLLUM MUELLERI, Sonder. Slender Water-milfoil. Fig. 7. Aust. only (W.A., S.A., V.).

A very slender plant, wholly submerged. All leaves are very finely divided, the lower ones in whorls of three.

and the upper ones simply opposite. Flowers are unisexual, in the upper axils. The plant is easily distinguished by the conspicuous hood-shaped bracts of the male flowers (7 a). It has been collected as yet only at the Curdie River, Mueller, and in the Geelong district, Point Lonsdale, Mueller, Barwon River and Queenscliff, J. B. Wilson.

OTHER WATER PLANTS BELONGING TO VARIOUS FAMILIES.

RANUNCULUS TRICHOPHYLLUS, Chaix (*R. aquatilis*, L.). Water Buttercup. E., As., Afr., Am., Aust. (S.A., T., V., N.S.W.). Fig. 1.

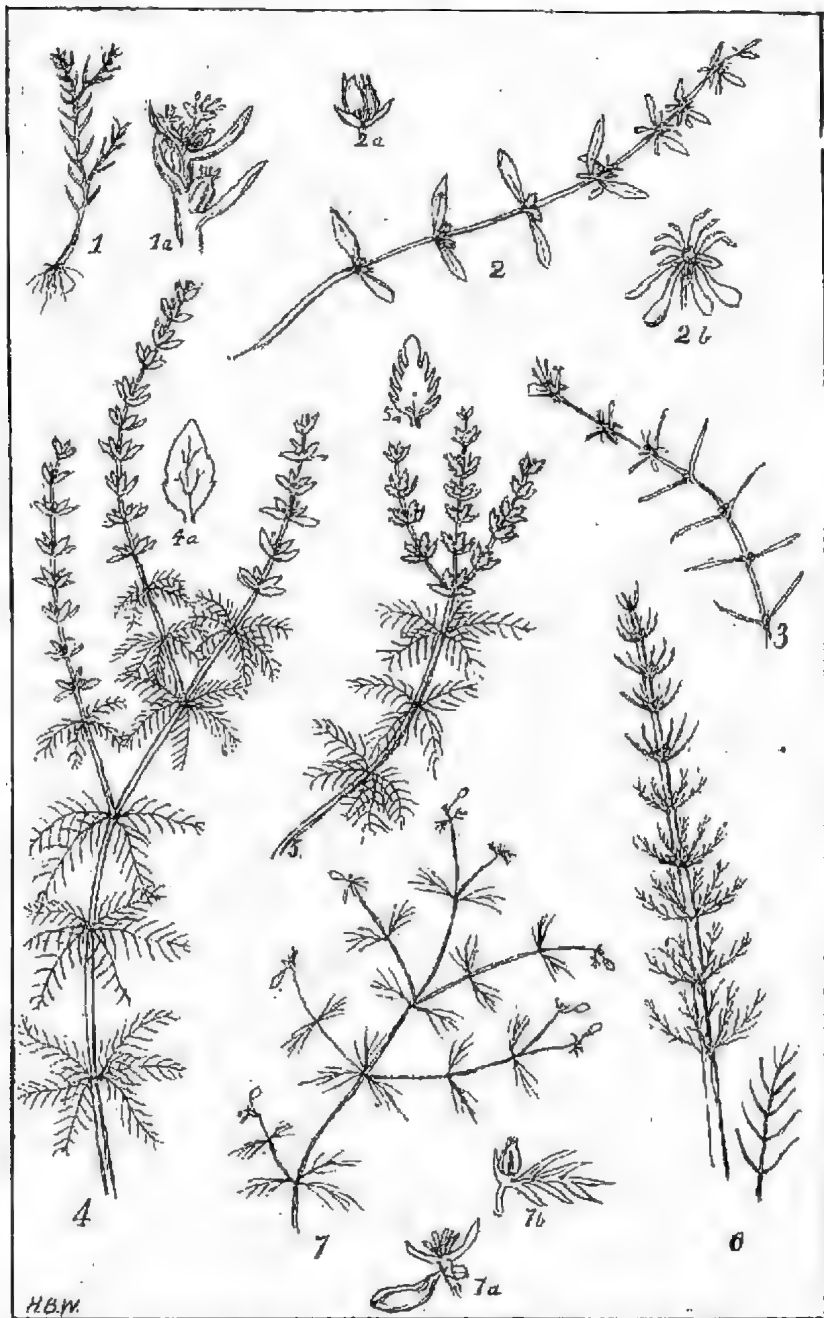
A submerged plant with leaves divided into numerous hair-like segments. Flowers, the only portion of the plant that appears above the surface, are white, and very small, less than $\frac{1}{4}$ inch in diameter, and are typical Buttercups except as regards colour. It has been recorded from all parts of the State.

RANUNCULUS RIVULARIS, Bks. & Sol. River Buttercup. Fig. 2. Aust. (all States but W.A.) and N.Z.

A common plant in shallow water, growing from creeping stems, and easily distinguished from the common *R. lappaceus* by that character as well as by its glabrous digitate leaves, either submerged, floating or emerging, and its narrow petals, usually about 8. (2 a.). When the leaves are submerged they are much divided. This is also widespread through the State.

BRASENIA PURPUREA, Michx. *B. peltata*, Pursh. *Cabomba* in Mueller Key. Water-shield. Fam. *Nymphaeaceae*. Fig. 3. As., Am., Aust. (V., N.S.W., Q.).

Growing from a prostrate rhizome at the bottom of lagoons, with floating peltate leaves attached by their centre to long petioles, oval, entire, 3-4 inches long, and about 2 inches wide. Submerged parts of the plant are, especially when young, covered with a thick coating of transparent jelly. Flowers (3 a) floating, of a dull purple, and borne on long axillary peduncles. Sepals 3 and petals 3, all very much alike, nearly half an inch when they first open, but lengthening later to nearly an inch. A plant very rarely gathered in Victoria, "Lower Mitta Mitta, F. Mueller," and "Mitta, Mrs. Flora Martin," are the only records.



1, *Myriophyllum integrifolium*. 2, *M. amphibium*. 3, *M. pedunculatum*. 4, *M. elatinoide*s. 5, *M. verrucosum*. 6, *M. propinquum*. 7, *M. Muellerei*.

CERATOPHYLLUM DEMERSUM, L. Common Hornwort.
Fam. *Ceratophyllaceae*. Fig. 4.

Most widely distributed in all parts of the world, and in all the States of Australia. A submerged plant with long stems and whorled leaves, resembling some species of *Myriophyllum*. The leaves, however, are dichotomously, not pinnately divided. The meaning of the generic name is "hornwort" from the resemblance to stag horn. The slender segments are minutely toothed. Flowers are very small, and solitary in the axils. Staminate and pistillate flowers are distinct, but on the same plants. Fruit (4a) oval, dotted, with two long straight spines near the base. Stigma long, persistent. Localities: Murray River. N.W. Eckert and N. E. Mueller. Pound Swamp, Bairnsdale, T. S. Hart.

JUSSIEUA DIFFUSA, L. Clove-strip. Fig. 5. Fam. *Oenotheraceae*. As., Afr., Aust. (S.A., V., N.S.W.).

Creeping plant in shallow water, with long leafy stems, which are provided at the insertion of the leaves with blister-like hollows (vesicles) to add to the buoyancy of the plant. Leaves are obovate or lanceolate, gradually narrowed into stalks, crowded towards the ends of the branches, where they are from 1 to 2 inches long. Lower leaves are often very small. The long-stalked flowers have 5 rather large yellow petals inserted at the summit of the ovary, which, after fertilisation, lengthens into a cylindrical fruit about an inch long. (5 b.)

LIMNANTHEMUM GEMINATUM, Grieseb. Large Marshwort. Fig. 6. Aust. only (V., N.S.W., Q., N.A.).

Stems floating or creeping, with long-stalked, orbicular-cordate, entire, floating leaves up to 2 inches in length, purplish below. These spring from the nodes, either a tuft of leaves without flowers, or a single leaf with an elongated flowering branch, along which the flowers spring in pairs, rarely 3 together, on pedicels 2 or 3 inches long. Calyx 5-cleft almost to the base, blunt. (6 a.) Corolla tender, large, yellow, with 5 lobes sparsely fringed on the margin, sparingly bearded at the base, without any crested membrane along the middle inside. Recorded from Mitta Mitta, Omeo, Avon River.

LIMNANTHEMUM CRENATUM, F.v.M. Wavy Marshwort. Fig. 7. Aust. only (all States but W.A. and Tas.).

A plant very similar to the preceding, distinguished by its leaves with somewhat crenate and wavy edges, with the under surface minutely dotted with glandules.

The calyx lobes are more conspicuously fringed at the margin, are bearded inside at the base, and have a prominent longitudinal wing along the centre. (7 a.) Recorded from Yarra River, Lower Murray, Colac.

HYDROCOTYLE VULGARIS, L. Common Pennywort. Fig. 8. E., Afr., As., Am., Aust. (S.A., V., N.S.W., Q.).

A plant creeping in mud or floating in water, with orbicular leaves 1 to 2 inches in diameter, attached by the centre (peltate) to long stalks springing from the creeping stems, with edges somewhat crenate. Flowers minute, in an umbel on a peduncle nearly as long as the leaf-stalk, with sometimes 1 to 3 whorls of flowers below. Fruitlets quite compressed. (8 a.) Recorded from all districts of the State, though not often gathered.

UTRICULARIA FLEXUOSA, Vahl. Yellow Bladderwort. Fig. 9. As. and Aust. (all States).

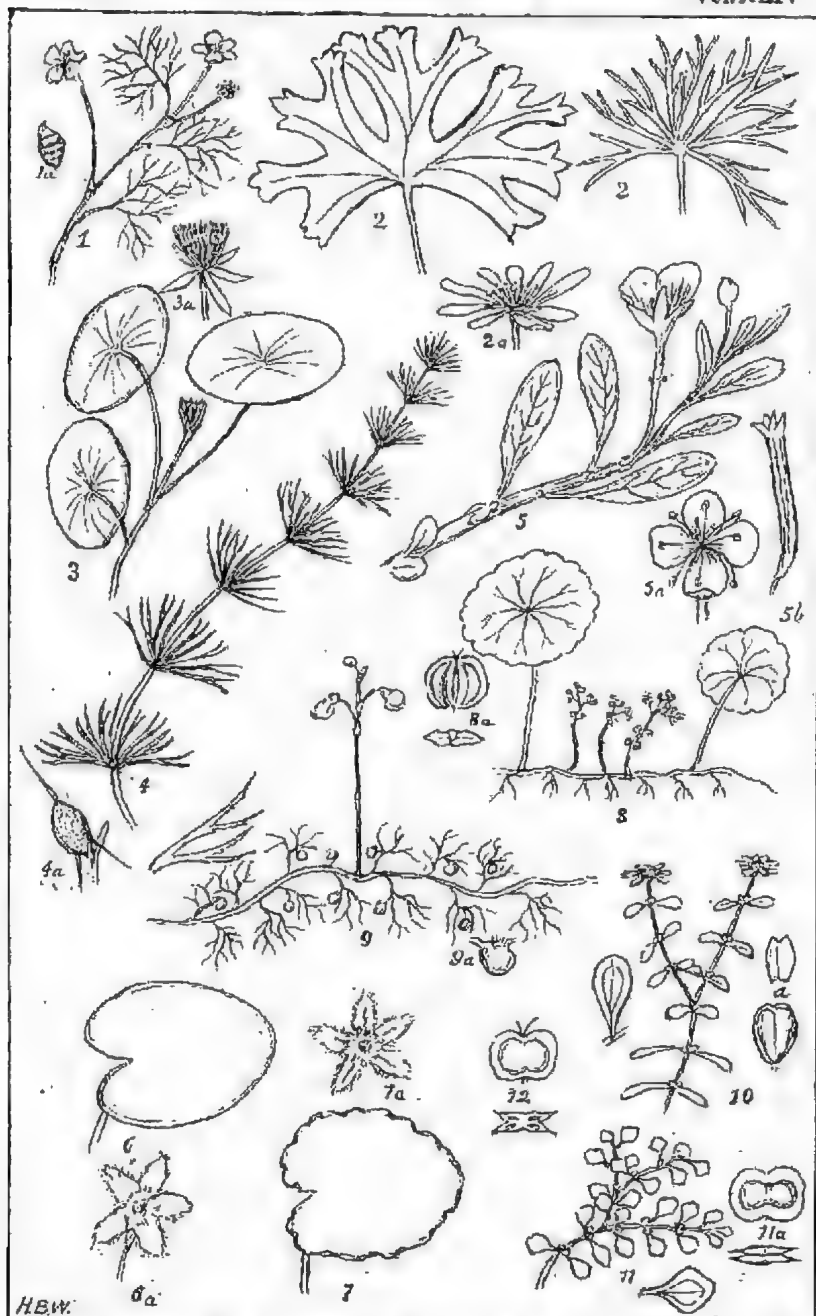
A submerged plant with leaves branching into numerous very fine segments, and resembling Water-milfoil or Water Buttercup, but by the presence of little globular vesicles or utricles, it can be easily separated from those plants. These utricles (9 a) which also occur on the roots of the more common Purple Bladderwort, *U. dichotoma*, are traps for animalcule which provide some nitrogenous food for the plant, which is cut off from supplies from the soil. Flowers emerge on stalks 3 to 6 inches long, surmounted by a short raceme of 3 to 6 yellow flowers nearly $\frac{1}{2}$ inch across. Recorded from Murray River, Omeo, Goulburn River, Yarra Glen.

Genus **CALLITRICHE**.

Slender aquatic herbs with opposite, entire leaves. Flowers unisexual, axillary, without perianth. Fruit more or less flattened, notched at the top, 4-celled and 4-lobed, that is surrounded by a double edge, the edges blunt, acute or winged, and consisting of two 2-celled disc-shaped carpels, united by their inner faces. Bentham says:—"The genus is found in almost every part of the globe, and, according to some botanists, consists but of a single species, others divide it into two, the Australian one belonging in that case to the one which has the most universal geographical range. Those who variously extend the genus to from 13 to 20 species, describe the commonest form as endemic."

CALLITRICHE VERNA, L. Water Starwort, Fig. 10. With the same distribution as *Ceratophyllum*.

A tender, aquatic herb with opposite, entire leaves. The crowded leaves at the ends of the branches often



1-2, *Ranunculus*. 3, *Brasenia*. 4, *Ceratophyllum*. 5, *Jussiaea*. 6-7, *Limnanthemum*. 8, *Hydrocotyle*. 9, *Utricularia*. 10-12, *Callitriche*.

float on the surface, forming starlike rosettes, hence the vernacular name. Lower leaves are narrow, and upper ones obovate, 3-nerved. Flowers are minute, axillary, unisexual, without calyx or corolla. Fruit 4-lobed, with compressed narrowly-winged fruitlets. Very abundant in all parts of the State.

Evidently Bentham and Mueller agreed that all the forms occurring in Australia except *C. Muellerei* could be included under this species name, but on critical examination of the specimens collected by myself, there seem to me a few distinct enough to rank as separate species.

(a) Hawkesdale, 1900. With nearly all leaves linear and 1-nerved, except at the tips of the branches; fruit wingless, dark coloured.

(b) Linton, 1911. With leaves linear except towards the ends of the branches, where they are spatulate with thin stalks; fruits wingless, on peduncles $\frac{1}{2}$ inch long.

(c) Geelong, 1906. Fig. 12. Leaves spatulate, showing distinct surface rosettes; fruit with broad wings. This resembles European specimens of *C. stagnalis*, Scop., but may be Hegelmeyer's *macroptera*.

(d) Mildura, 1912, Lake Hattah, 1913. A matted plant with minute leaves and fruit. This tallies with the type specimen of *C. Sonderi*, Hegelm. from "Station Peak, F. Mueller."

Specimens in Nat. Herb., Melb. (a) Say's Goulburn River spms. (b) None. (c) Spms. from various localities. (d) Bauerlen's Lake Cobham spms. Until reference is made to Hegelmeyer's Monograph, not available here, or to the Kew authorities, these may stand as forms of *C. verna*.

CALLITRICHE MUELLERI, Sonder. Round Water Starwort.
Fig. 11. Aust. only (V., N.S.W.).

Resembling *C. verna*, but just creeping in very shallow water, or on muddy edges of water courses, not forming floating rosettes. Its leaves are almost rhomboid (with distinct petioles), and the fruitlets are broadly winged. Recorded from Colac, Nyora, Snowy and Latrobe Rivers.

CONCLUSION.

Besides the plants dealt with in these articles, there is a number which may be termed semi-aquatic, including, under Monocotyledons, many Rushes, Sedges and allied plants, e.g., *Trithuria*, *Centrolepis*, *Brizula*, *Xyris*, *Eriocaulon*, *Restio*, *Crinum*, which are never found away from water, and whose roots are always submerged.

Among the Dicotyledons the following plants may be listed as semi-aquatic, and may be found enjoying their almost total submergence by temporary inundation:—*Claytonia australasica*, *Cardamine hirsuta*, *Montia fontana*, *Hypericum japonicum* (not *H. gramineum*), *Elatine americana*, *Viola Caleyana*, *Crantzia*, *Villarsia*, *Brachycome cardiocarpa*, *Cotula coronopifolia*, *C. reptans*, *Crassula recurva*.

Others, chiefly small plants, which revel in shallow water or mud are:—*Myosurus*, *Ranunculus parviflorus*, *R. Millarii*, *Caltha*, *Crassula bonariensis*, *Potentilla*, *Stuckhousia pulvinaris*, *Halorrhagis Brownii*, *H. micrantha*, *Hydrocotyle tripartita*, *H. medicaginoides*, *H. callicarpa*, *Centella*, *Mitrasacme distylis*, *Wilsonia*, *Mazus*, *Mimulus*, *Gratiola*, *Glossostigma*, *Utricularia*, *Polypompholyx*, *Lobelia anceps*, *Pratia* (several), *Isotoma fluviatilis*, *Goodenia humilis*, *Selliera*, *Stylidium perpusillum*, *S. despectum*, *Cotula filifolia*, *C. integrifolia*, *Myriocephalus rhizocephalus*. These do not include large swamp plants, *Sprengelin*, *Melaleuca*, *Lythrum*, *Lycopus*, etc.

NOTES FROM MY DIARY.

Jan. 3.—Observed a Brown Hawk, *Iernacidea berigora*, feeding on a freshly-killed rabbit—probably the hawk had killed it.

Jan. 10.—Three stalks of Hyacinth orchids between 2 feet and 3 feet in height, were carrying 27-35 and 37 flowers—a total of 99 flowers on the three stalks. Measured a fine specimen of *Rhagodia haccata*; the stem was 9 inches in circumference at a foot from the ground.

Jan. 28.—Note that the *Banksia* Longicorn beetle moves about chiefly at night; and is quite active on its feet.

Feb. 6.—Saw a young Pallid Cuckoo being attended by a pair of White-eared Honeyeaters, which were obtaining food from among the foliage of a Manna gum.

Feb. 7.—First flowers noticed on *Banksia marginata* and *B. integrifolia*.

Feb. 23.—Musk Lorikeets here again; they were absent during the summer.

March 6.—A Peaceful Dove observed, feeding around a haystack; apparently it was obtaining fallen oat-grains. This bird is seldom seen here.

Mar. 11.—Saw first party of Red Wattle-birds on their flight northward for the winter.

Mar. 15.—Note that young Magpie-larks and Red Wattle-birds remain with their parents only for about six or eight weeks after leaving the nest; whereas young Magpies stay till the following June or July (almost 12 months).

Mar. 20.—Young King Parrots have appeared on their annual visit to these parts.

Mar. 21.—*Boschnia heterophylla* just coming into bloom.

Mar. 23.—*Prasophyllum nigricans* in flower.—FRED. BARTON, Inr. (Spermwhale Head Gippsland Lakes, Vic.).

POLLINATION OF *CRYPTOSTYLIS LEPTOCHILA*, F.v.M.

BY (MRS.) EDITH COLEMAN

In a preliminary paper on this subject (see *Vic. Nat.*, May, 1927), I described a remarkable partnership between the orchid *Cryptostylis leptochila*, F.v.M., and an ichneumon-wasp, *Lissopimpla semipunctata*, Kirby, male. A picture was given showing the extraordinary manner in which the insect visits the flower. Further observations this season not only support my previous assumption, but point to an exclusive partnership between the orchid and the wasp.

As stated in the previous paper, all the visiting insects entered the flowers in a reverse manner from that of most nectar-feeding hymenoptera, and thus removed the pollen, not on the head, proboscis or back, but on the tip of the abdomen! It was soon clear that our wasps were seeking neither nectar nor edible tissue; and, as they were all males, there could be no question of egg-placing, either in any larvae hidden in the flower, or in the viscid matter of the stigma. I could form only one conclusion, and in this I was supported by Dr. R. J. Tillyard.

Until recently, the possibility of any attraction, other than nectar or edible tissue, offered by flowers to insect visitors, had not been suspected. Even Darwin overlooked what now appears an obvious conclusion, and in his *Fertilisation of Orchids*, commenting on a statement by G. E. Smith in his Catalogue of Plants of S. Kent, that "Mr. Price has frequently witnessed attacks made upon the Bee Orchis by a bee," he adds, "What this sentence means I cannot conjecture." The riddle of those strange attacks has almost certainly been solved, in the first place, by Monsieur M. Pouyanne, in Algeria; later, by Colonel M. Godfery, F.I.S., at Hyères, France; and perhaps even more conclusively by the interesting partnership that forms the subject of this paper.

In the Algerian case, M. Pouyanne witnessed the pollination of *Ophrys lutea* by a small hymenopteron, male, which alighted on the flower in the reverse manner adopted by our ichneumon-wasp, carrying off the pollen, "not on the head, but on the tail." Colonel Godfery, who has given much time to the study of orchid-pollination, witnessed a similar instance, where the visiting insect entered the flowers of *Ophrys fusca* in the same way:

removing the pollinia on the end of its abdomen. With the proofs that we can offer, what was formerly only a matter of conjecture as to the motive actuating the strange behaviour of the insects, becomes practically a certainty.

It is, I think, safe to assume that, as the orchid *C. leptochila* is visited by male wasps only, and as these are seeking neither nectar nor edible tissue, they are answering to an irresistible sex-instinct, and the reason for the unusual partnership thus becomes less incredible than it at first appeared. We know that pollination is the sole object in the structure of an orchid, and we are familiar with the many strange devices adopted by flowers to achieve this end; but in the present instance the perfected plan of the flower to obtain the benefit of cross-pollination unfolds a scheme unrivalled, surely, in the history of entomophilous flowers.

The most remarkable feature of this unusual partnership is its almost certain exclusiveness. Were the same insect acting as pollinating agent for any other members of this genus, we should expect to find hybrids among them. Visits to the parents of different species would undoubtedly bring about an interchange of specific characteristics, yet, though I have found *C. leptochila* growing in close association with another member of the genus (*C. subulata*, Labill.), I have never seen a hybrid between these two types. Dr. R. S. Rogers, who is the Australasian authority on orchids, tells me that he has never seen a hybrid in the genus *Cryptostylis*.

Several theories may be advanced as to the nature of the attraction offered by the orchid. Scent and mimicry are undoubtedly a part of it.

MIMICRY.—Though, from its structure, the service of an insect is necessary for the pollination of *C. leptochila*, the appearance of the flower does not, at first sight, suggest the desire for insect agency. There are no bright colours held out to attract the wasp, but, instead, a cunning mimicry is more than suggested. A glance at the strange labellum, modified out of all proportion to the thin, almost thread-like petals and sepals, with its double row of dark glistening glands that gleam in the hot sunshine loved by the wasp, is perhaps sufficient to justify the theory of an attraction based on the resemblance of the flower to a female wasp. Even to our eyes, the likeness is apparent. To the inferior eyesight of the insect, the resemblance may be still more convincing.



Lissopimpla semipunctata: 1 and 3, males; 2, females.
Photos. considerably enlarged.

The labellum and column are clearly the parts of the structure on which the flower has expended most energy. While I was experimenting with four spikes, on which were 45 spent flowers, an insect selected the only open flower at the top of one spike, and entered swiftly. Though the narrow segments of the spent flowers presented an insect-resemblance even at this stage, they apparently held no interest for the wasp, nor was any flower visited when half of its labellum had been cut off.

On several occasions, this season, a flower has been visited twice, and one detached flower was entered a second time as it lay on the stable. This partly disposes of my theory that the prominent rostellum, with its dark-coloured disc, holds the key to the attraction. Though mimicry would appear to be the chief lure, I can cite instances which point just as surely to scent, though this is almost imperceptible to me.

I have, this season, seen an insect "tacking" swiftly once or twice over a flower before entering. I concluded it was tracking the orchid by its scent. During January, some spikes were sent to me at Healesville, a locality in which *C. leptochila* has not so far been recorded. A few minutes after they were exposed, the flowers were entered by the males of *Lissopimpla semipunctata*. Dr. Rogers, who was staying with us at the time, was much interested in these experiments. Some spikes were placed on a shelf under an open window in his room, and almost instantly two, then three, wasps entered the room and visited the flowers.

I was experimenting here myself on February 1st. Having occasion to leave the room, and not wishing the flowers to be pollinated in my absence, I closed the window. There were then no wasps visible. Returning in a few moments, I found three on the window-pane and one inside! I had inadvertently left the window open less than an inch at one side.

On another occasion, I had only three flowers left, and needed a photograph of the wasp actually "*in*" the orchid. The first and second flowers, with their visitors, were snipped off into the killing-bottle, but in each case, the insect freed itself from the flower, and was given its liberty, apparently none the worse for its unpleasant experience. The bottle was then recharged with cyanide, and in less than ten minutes the last flower and its guest were secured and duly photographed.

These instances, and the fact that a single flower will lure an insect from a distance, would suggest that, even though the perfume is so subtle as to escape our notice, it is very readily conveyed to the wasp.

A glance at the column of the orchid serves to emphasize the remarkable precaution taken to prevent self-pollination. By the inversion of the flowers, the anther-cells lie below the saddle-shaped stigma, and the prominent rostellum, projecting over the anther, prevents the reception of its own pollen by the stigma of the orchid. To follow closely the act of pollination increases one's belief in the sagacity of plants. Even more wonderful than the outward modification of the flower for the attraction of the insect is the structure of the parts concerned with reproduction, all doubtless specially adapted to the shape and habits of the wasp. Such cunning adjustment of its essential organs for the achievement of cross-pollination suggests a plant diplomacy to which the eager instincts of the insect cause it to become a willing victim.

The wasp flies directly to the flower selected. Grasping the labellum with its two front pairs of legs, it then draws up the long hind legs so that they clasp the upright posterior margins of the labellum. This brings the abdomen of the insect into the falcate curve, which enables the tip to penetrate the stigma of the orchid, near the base of the labellum. The upper surface of its body, at the last segment, rests on the viscid disc of the rostellum.

Mark the cunning of the plant, which first manufactures the sticky substance, and then delays the insect long enough for the viscid disc to adhere to its body! With the effort needed to free itself, the wasp exerts pressure on the rostellum. This pressure opens the anther-cells and releases the pollinia (whose caudicles are attached to the disc), and these are withdrawn by the insect, adhering to the last segment of its abdomen. The curve of the abdomen ensures the withdrawal of the pollinia clear of the stigma, otherwise the purpose of the partnership would be defeated, and self fertilisation would result.

Occasionally, the insect has had some difficulty in freeing itself, owing to its hooked feet becoming too firmly attached to the labellum, and has completely twisted its body round. In these instances I have found a considerable quantity of pollen left upon the stigma. In most cases, however, the pollinia are withdrawn cleanly, and

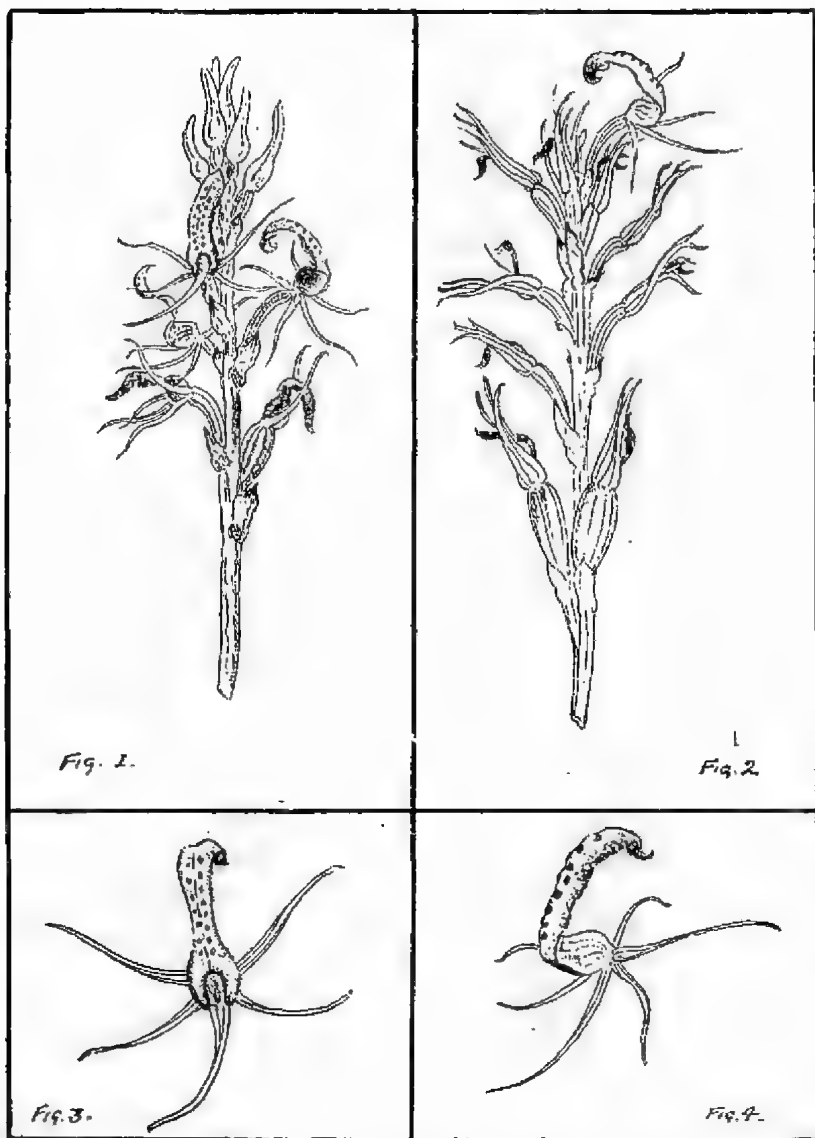


Fig. 1: Flowering spike of *Cryptostylis leptochila*, F.v.M. Fig. 2: Although the narrow segments of spent flowers bear an insect resemblance, the wasp selects the only open flower at the top of a spike, and enters swiftly. Figs. 3 and 4: Top and side view of a single flower, showing mimetic modification of labellum.

adhere always symmetrically, at right angles to the body of the insect.

On exposure to the air, the viscid disc contracts and the caudicles become depressed—though this movement is less apparent than in many other orchids. With the straightening of the insect's abdomen, the pollinia are brought parallel to it, and slightly projecting beyond the tip—in the exact position for striking the stigma of the next flower visited.

At this point it is safe to assume that "pairing" does actually take place, and that if not disturbed, the wasp affects pollination, either with pollen from a distant orchid, or from another flower on the same spike. In more occasional instances, where the insect experiences difficulty in freeing itself, it impregnates the orchid with its own pollen.

But I think I have shown that cross-pollination is more frequently effected, for, by the time the impulse recurs in an undisturbed insect, it has had time to fly to a fresh spike, possibly at some distance. The matter can be closely and scientifically studied, and no other explanation offers itself.

Normally, the season of the orchid is from December to the end of February, but where the flowers do not secure pollination, they have a wonderfully long period of anthesis, so that I have been able to continue experiments until March 20th with flowers, some of which had been in water for over a month. As each flower expanded it has been visited, though the wasps at this period came singly and at longer intervals.

During the early part of January the orchids attracted large numbers of insects. Competition was keen, and they entered the flowers regardless of our presence. If disturbed, they entered a second, and even a third, flower, and we thus saw them bearing away several pairs of pollinia. Sometimes two wasps entered a flower simultaneously, in which case only one carried away the pollinia. Later in the season, they visited the flowers in only twos and threes, and were not nearly so eager; while, by the middle of March, it was unusual to see more than one wasp.

A few facts concerning the habits of the orchid may serve to link it more conclusively with its agent. One notes, on the whole, its general infertility, but a study of its root system shows that it is not dependent for increase on the caprice of its winged agent.

Like many other plants that multiply in the same vegetative manner, it only needs to safeguard its future by a supply of seed in the event of the plants becoming exterminated during an unfavourable season. A "discriminating intelligence," doubtless, suggests that this purpose will be better served with a more vital seed resulting from cross-pollination, and so, with a Machiavelian cunning almost beyond belief, the orchid lures the artless insect to its service.

In favourable situations, the plants are so robust that one is struck by the absence of capsules. Taking five spikes, on which were 54 expanded or spent flowers, I found only four capsules. Other instances have given an even lower average. On spikes up to 2 feet tall, bearing as many as 25 flowers, it is not uncommon to find only one capsule set, while the flowers on dozens of spikes set no seed at all.

It is usually the earliest flowers to open that set capsules. Apart from the usual vigour of first flowers, it appears as if these top flowers hold less attraction for the wasps.

Their numerical strength and their eagerness during the earlier part of the season, have suggested to me that the males of *Lissopimpla semipunctata* emerge considerably in advance of the females, possibly more so than is generally suspected. I am not an entomologist, and in giving these details of the partnership, I have purposely refrained from using entomological terms. I have merely described the action of the wasp as it appeared to me to bear on the botanical side of the matter.

The photographs on page 335 are adapted from stereoscopic photographs, by Mrs. Ethel Baves. The line drawings on page 338 are the work of Mr. W. H. Nicholls. I am greatly indebted to these two members of the Club for the illustrations. The task of photographing the insects was not an easy one, more especially as I am unskilled in the art of "setting" insects, and owing to their having been damaged in transit through the post. I am also indebted to Mr. J. A. Kershaw, who kindly supplied the insect (female) photographed.

EXPLANATION OF PAGE 335.

No. 1, *Lissopimpla semipunctata*, Kirby (Male); after visiting the orchid, showing pollinarium on tip of the abdomen. No. 2, *Lissopimpla semipunctata*, Kirby (Female). 3, Male, showing curve of the abdomen, which allows the pollinia to be withdrawn clear of the stigma. Holding the living insect between the thumb and finger, the movement of the caudicles can be clearly followed. Their depression takes from 30 to 40 seconds. In less than a minute the abdomen of the insect resumes its normal position.

THE FLORA OF THE BLACK RANGE.

BY J. W. AUDAS, F.L.S., F.R.M.S.

(National Herbarium, Melbourne.)

The Black Range is situated about 40 miles, in a south-westerly direction, from Horsham. In October, 1927, with Mr. H. B. Williamson, Mr. Harold Smith, of Horsham, and others, I made several trips to the Range. In close proximity to Horsham is a fine park. Fine avenues of Sugar Gums, *Eucalyptus cladocalyx* have been planted, and some splendid trees of the Black Box, *E. bicolor*, and Red Gum, *E. rostrata*, are growing in their natural state. Two small composites, the Basalt Daisy, *Brachycome basaltica*, and Beauty Buttons.

The objective of our first day's excursion was the highest point of the Range, Mt. Byron. Leaving by car early on the morning of October 29, we travelled via Horsham, Brim Paen, Glenisla, and Hamilton roads—passing the State School plantation at McKenzie Creek, five miles from Horsham. Just before crossing the Norton Creek, 18 miles south of Horsham, a plantation of Monterey Pines, *Pinus radiata*, attracted attention. We travelled for about nine miles through a forest, composed chiefly of Long-leaf Box, *Eucalyptus elaeophora*, Black Box, *E. bicolor*, Brown Stringy-bark, *E. capitellata*, Messmate Stringybark, *E. obliqua*, Common Peppermint, *E. australiana*, River Red Gum, *E. rostrata*, and Yellow Gum, *E. leucoxylon*, which was in full bloom.

At Murchong Creek fine specimens of Lavender Grevillea, *G. lavandulacea*, with beautiful spikes of pinkish flowers, *G. alpina*, *Stypanandra glauca*, *Hibbertia linearis*, *H. acicularis*, *H. virgata*, *H. stricta*, and *H. densiflora*, were gathered. Further on, we found a number of shrubs of a *Pultenaea*, which we were especially desirous of obtaining. Mr. Smith had previously sent a specimen of this shrub to the National Herbarium for identification, and I had informed him that it was a species new to science. It is a handsome shrub, attaining a height of three feet to four feet, has spreading branches and round, dish-shaped leaves; the blooms, dark purple and yellow, are abundant. This new species belongs to the section *Coelophyllum*, and should have a place near *P. Vrolandi*, from which it differs in the shape of leaves, bracteoles, and other distinct characteristics. Growing in association with it were the follow-

ing shrubs:—*Spyridium parvifolium*, *Prostanthera denticulata*, *Hakea rugosa*, *Dillwynia ericifolia*, *D. floribunda*, *Leptomeria aphylla*, *Banksia ornata*, *Banksia marginata*, *Daviesia corymbosa*, and *Brachyloma daphnoides*.

Reaching the foot of the Mount, we ascended by means of a deep gorge, through which, in the wet season, a small stream flows. At this season it was quite dry. In the gorge were numerous young plants of Plume Humea, *H. elegans*—a robust herb, which grows to a height of about eight feet to ten feet. When mature, it is a very handsome plant, with large leaves, red or pink feathery panicles of flower-heads, and has a strong, tobacco-like perfume—occasionally it is misnamed "tobacco plant." Another attractive shrub was the Derwent Speedwell, *Veronica Derwentia*, with its racemes of pure white flowers, fully a foot in length.

About half way to the summit, we came to a mass of rock, which appeared to be built up of sandstone blocks; through the face were noted several lines of strata, running at different angles, indicating a remarkable geological history. Our leader stated that a geologist, who had recently visited the Mount, was interested in the formation of this rock, saying that it was one of the most remarkable sedimentary deposits he had seen. Growing in favorable places were the Hairy Correa, *C. aemula*, Fairy Fan Flower, *Scuevola aemula*, Angular Pigface, *Mesembryanthemum aequilaterale*, and the Bell Climber, *Marianthus bignoniaceus*.

On the rocky ledges towards the summit, Nature's garden was gay with Grampian Fringe Myrtle, *Calytrix Sullivani*, Fringe Heath Myrtle, *Micromyrtus ciliatus*, Snow Myrtle, *Lhotskya genetylloides*, Bushy Heath Myrtle, *Thryptomene calycina*, Crimson Kunzea, *K. parvifolia*, Slender Honey Myrtle, *Melaleuca gibbosa*, Common Fringe Myrtle, *Calytrix tetragona*, Nodding Blue Lily, *Stypanandra glauca*, Prickly Grevillea, *G. aquifolium*, Blush Heath, *Brachyloma ericoides*, Rough Mint Bush, *Prostanthera denticulata*, Showy Parrot Pea, *Dillwynia floribunda*, and Heathy Parrot Pea, *D. ericifolia*, with flowers of a deep orange and red, in terminal clusters or corymbs. In some sheltered, mossy places beautiful specimens of the Bristly Trigger plant, *Stylidium soboliferum*, Purple Bladder Wort, *Utricularia dichotoma*, and Forked Sundew, *Drosera binata*, were gathered—the latter being easily distinguished by its forked leaves and

large white flowers. Further on, some good specimens of the new *Pultenaea*, in full bloom, were obtained; and, on reaching the highest point of the Mount, we viewed the cairn erected by Major Mitchell in 1838. The cairn was in good condition, but the timber forming the flag-staff—a Cypress Pine pole—was almost decayed.

A magnificent panoramic view was gained Northward, the plains of the Wimmera extended, with Mt. Arapiles looming in the distance, while on the south the peaks of the Grampians were plainly discernible.

On the following day, we left early in the morning, via the Natimuk road, along which we travelled for five miles to the west, through the famous black soil plains, almost entirely under crop. Turning due south, we crossed the Wimmera River at Kenny's Ford Bridge, on Noradjuha road, and further on the Quantong Irrigation Channel was crossed. This channel carries water from the Wartook Reservoir to Noradjuha. Still bearing to the south-west, we crossed the Norton Creek, about a mile above its confluence with the Wimmera. At this point the road branches, one branch leading to Noradjuha, and the other to Balmoral.

About nine miles from Horsham we were surprised to come upon a large tract of typical Mallee scrub, about ten square miles in extent. Over the larger portion of the area the following Eucalypts represent the main portion of the taller shrubs, viz.:—Oil Mallee, *Eucalyptus oleosa*, Green Mallee, *E. viridis*, Blue Mallee, *E. polybractea*, and Dumosa Mallee, *E. dumosa*. Here and there were groves of Acacias, viz.:—*A. pycnantha*, *A. rigens*, *A. verniciflua*, *A. brachybotrya*, *A. diffusa*, *A. sclerophylla*, *A. myrtifolia*, *A. Oxycedrus*, and *A. glanduligera*—the latter named by the late F. M. Reader on account of the glandular hairs in the pods. *Melaleuca Wilsonii*, a very pretty shrub with spikes of crimson flowers, was met with in profusion. Sprinkled throughout the area were noted the following species:—*Loudonia Behrii*, *Lasiopetalum Baueri*, *Baeckea Behrii*, *Beyeria Leschenaultii*, *Eutaxia*, *Olearia decurrens*, *Dodonaea bursarifolia*, *Daviesia brevifolia*, *D. pectinata* (having stiff, broadly decurrent leaves with sharp points), and *Pittosporum phillyraeoides*, a handsome shrub with pendent branches and willow-like leaves. The flowers are yellow and sweetly scented, and the fruit, when split open and displaying its red seeds, is somewhat ornamental. Owing to the dry season, few

good blooms of any plant were obtained. It was noted that the locality would be a splendid field for botanical study.

Continuing our journey, we passed through the parishes of Narragan and Nurabiel. About 20 miles from Horsham, we turned off the main road to the south, and approached Mt. Talbot, by a bush route known to our guide. At the Mount, we encountered a dense growth of the Bushy Heath Myrtle, *Thryptomene calycina*. The bushes were past their best flowering time. Some were eight feet to ten feet in height. Other plants were, chiefly, Messmate Stringybark, *Eucalyptus obliqua*, and Long-leaf Box, *E. elaeophora*. Mt. Talbot is difficult to ascend, being nearly perpendicular, and consisting of rock devoid of vegetation except that growing near the base or in the fissures of the rock—such species as the Grass Trigger-Plant, *Helichrysum lucidum*, *Billardiera scandens*, *Olearia myrsinoides*, and *Correa aemula*. From the top of the Mount, a fine view of the surrounding country is obtained. In this locality some of the finest wool in Australia is grown, the Mt. Talbot and Melrose clips being world-famous for texture and quality.

Travelling in a south-easterly direction, along a very rough, scrubby track, winding through sandy ridges and deep washouts, we decided to make our objective the northern slopes of the Black Range. Getting into better country, botanically speaking, and passing through some timber we noticed nice bushes of *Boronia coerulescens*—the flowers ranging in colour from pale blue through all the stages of mauve, violet and pink. After traversing the foothills for some distance, we found we could penetrate no further with the cars, and as it was too late to ascend these slopes, we abandoned the project and, instead, made an examination of the surrounding country.

In this vicinity some fine bushes of *Pullenaea D'Altonii* in full bloom were seen. This species, described recently, from specimens collected years ago near Nhill, had later been recorded from Steiglitz. It is a showy plant, with drooping foliage and yellowish blooms, and attains a height of about six feet; it is well worthy of cultivation. A feature of the locality was the Daphne-Heath, *Brachyloma daphnoides*, which grows plentifully throughout the whole district—it is an erect, bushy shrub, and attains a height of about four feet. Amongst interesting plants of a smaller kind were the Snow Beard-Heath, *Leucopo-*

gon virgatus, Rosy Heath-Myrtle, *Baeckea ramosissima*, and the Spreading Flax-Lily, *Dianella revoluta*.

On Monday morning we inspected the High School, which has been recently built, and contains all the latest equipments. In the school enclosure a plot is devoted to the culture of Australian wildflowers. We noted that the plants were thriving well. Following the Dimboola road, we passed through Dahlem, Pimpinio, and Wail, en route for the Little Desert, south of Dimboola. In the Desert everything showed the effect of an abnormally dry spring—the only bright feature being patches of the Golden Pennants, *Loudonia Behrii*, and the scarlet flowers of *Kennedya prostrata*. We noted enormous heaps of the Porcupine-Grass, *Triodia irritans*, which was dry and decayed in the centre, while the outside portions were quite green. The Yellow Gum, *Eucalyptus leucoxydon*, the principal Eucalypt here, was in full flower. The smaller branches from many of the trees were thickly strewn on the ground, having been broken off by the Gang Gang Cockatoos, which visit these trees in the flowering season in search of the nectar contained in their blossoms.

The trip to the Desert was disappointing, and on the return journey we selected a different route, passing through the wheat-fields of the Horsham plains. We saw a reserve, where the land is in its virgin state, and the only trees growing on it are the Black Box, *Eucalyptus bicolor*, and Buloke, *Casuarina Luehmannii*. The effect of drought was observable on the wheat-fields, some of which looked dry and yellow, but others promising.

Our collection of plants, gathered during the various trips, comprised about 100 species. During two days, only partial examination of the flora of the Black Range could be made. As the Range is sixteen miles in extent, there is scope for further investigations.

ORIOLES AND CATERPILLARS.

Orioles, *Oriolus sagittatus*, visit us every year, but until this summer, we had supposed that they took nothing from the orchard except figs. Now we find that they must not be regarded merely as fruit-eating birds, whose presence we welcome because of their beauty. They seem to have just discovered that vine moth larvæ are good to eat, and lately have been at the vine every day, feasting, not on grapes, but on caterpillars. A note in the *Naturalist* for January, 1927, mentions Orioles as feasting on the pests, at Sperrn Whale Head; but I had not until this year noticed them eating caterpillars at Tyers.—J.G.



BIRD HOME BURIED.

When out with some Girl Guides at Ringwood, in October, 1927, we had an interesting little adventure with a pair of spotted Pardalotes *Pardalotus punctatus*. After lunch, the Guides buried all fragments of paper, orange peel, etc., in a hole made by the fall of a tree. Soon, through a mosaic of song, we were aware of a note of distress. It came from a Pardalote, which fluttered timorously among the saplings near us. Without doubt, we were close to its home, yet could see no place for a nesting-tunnel. Presently our troubled visitor was joined by her mate, and the two came nearer and nearer, exchanging plaintive pipings all the time. More than once they alighted above the hole where the rubbish had been buried, and hopped about agitatedly until we realised that their home must be beneath the fragments, hidden there. Hastily we dragged them away, while the birds retreated to the trees.

In one side of the hole we found the broken entrance to a nesting-tunnel, so placed that it was little wonder we had not seen it before. We moved the last of the rubbish and went softly away, fearing that the Pardalotes would be too frightened to return—but our fears were needless. We paused at the nesting-hole that evening and pointed out the site of the home to the Guides. There was no movement, nor any sign of a bird, so we went on softly. As we passed there was a flutter among the bracken—the Pardalote had heard our footsteps, and was leaving the nest, which she had recovered, and where, no doubt, she had been all the afternoon.—(MISS) J. GALBRAITH.

SHOCK OR SIMULATION?

Experience with insects, mainly beetles, and several birds, suggested study of records and consideration of conflicting theories. Some authors declare that when a Click-beetle (*Elater*), for instance, drops to the ground and remains apparently lifeless for a while, it is shamming to be dead. Others, with more reason, probably, say that the inert state in question is due to shock—it is really a case of hypnosis. Animals can have no knowledge of death, and therefore are unable consciously to simulate it.

And yet—birds provided evidence that supports the "conscious deception" theory. The actions of a Chat (*Epthianura*), tumbling along, away from its nest and before an intruder, have convinced many observers that, at least, birds *pretend* to be wounded. Less familiar, among birds, is complete inertia, though common enough in the insect world.

Fabre, ever inclined to reject accepted opinion, without Nature's supreme authority, has dealt with this fascinating subject in two chapters of his "Glowworm and Other Beetles." As the result

of many experiments with insects, he decided against "shamming," which implies reason, in favour of hypnosis: "When would-be scientists proclaim aloud, when they declare that a wretched insect knows the trick of simulating death, we will ask them to look more closely, and not to confound the hypnosis, due to terror, with the pretence of a condition unknown to the animal world."

My own observations, and some few experiments, persuade me that Fabre was right in denying to insects the power to *simulate* death; most certainly many species have a habit, of fainting, as it were, and for varying periods lying immobile after a shock—the lightest touch will cause a Click-beetle to fall, and assume the rigid attitude of death. Spiders, also—some species, not all—react in a similar manner, when instinct gives the alarm. Only, they become limp, instead of rigid—as one finds the paralysed victims of a hunting wasp, in little clay cells on a wall.

For hours the state of inertia may last, but usually it is not prolonged. The "dead" Click-beetle soon recovers—leaps into life again! Weevils are among the "shammers" that surely are unconscious of fraud. Dying, apparently, in a moment, they come to life gradually. Inertia in insects may be produced, as Fabre proved, by concussion, sharp change of temperature, immersion in water, and, of course, subjection to etheric vapour.

Birds are not governed entirely by instinct; they have some power of reasoning; and when the Chat lures you away from its nest, it may be in control of its movements, and not reacting to shock. The recovery, often, occurs suddenly; and the "trick" may be repeated, should you approach the nest again. Conscious deception, or otherwise, it deserves more intensive study than it has received.

In the Mallee, when photographing at a nest of the Black-backed Wren, *Malurus melanotus*, I was distressed to see the male bird fall from its perch on a spray, nearby. It had been flying around for several minutes, while I erected the camera and focussed on the nest, which contained callow young. The female Wren was bolder than her mate, returning to the nest several times. The heat was great, and when the male dropped suddenly, I thought that possibly sunstroke was the cause. When picked up, the bird lay limply in my hand, and closed its eyes. Its head rolled aside, as a dead bird's does, when the little body was lifted. I put it down gently, near the nest, and resumed work with the camera. Presently Wren notes sounded—and there was my "dead" bird on the spray again, beautiful, animated, and chiding me in song. Had he simulated death, or was inertia due to shock—fear for the young?

North, in his account of *M. cyanus*, states, without reservation, that Blue Wrens "feign to be wounded, or simulate death very well." An adult male temporarily stunned, soon recovered and tried to escape from the hand that held it. Failing to do so, it closed its eyes and gradually allowed the head to fall down, as if it were dead. But, when unobserved, it again made efforts to get away. This was repeated several times. Finally, when held out in the open palm of the hand, it quickly flew away.—(*Nests and Eggs*, I, p. 207.)

Observers who have had similar experiences with birds of any species, should record them.—C. BARRETT.

GIANT KING FERNS.

Mr. C. French, Senr., writes:—"I have read with very great interest in recent issues of the *Naturalist*, Mr. Chas. Daley's excellent *resumes* of the correspondence between Baron von Mueller, and the Hookers, of Kew (England). I note in Part 6 (Dec., 1927, p. 221), and Part 7 (Jan., 1928, p. 248), the remarks regarding a giant King Fern, *Todea (Asmunda) barbara*, which the Baron sent to Kew in 1869. Though at that time on the staff of the Melbourne Botanic Gardens, of which the Baron was the Director, I do not remember this particular specimen being sent away; but as I know that the late Mr. W. Gessner, of Wheeler's Hill, procured for the Baron several very large *Todeas*, at various times, from the Dandenong Ranges, it was doubtless one of these.

My son, Charles, now Government Entomologist, distinctly remembers having, when attached to the National Herbarium, stencilled the address, "St. Petersburg," on a large case containing a *Todea*, that was sent to Russia. On one occasion, at the desire of the Baron, I accompanied Mr. Gessner to Mast Gully, near Upwey, to obtain a very large specimen for the fernery established in connection with the Melbourne Exhibition of 1888. This weighed almost a ton. I was present at its planting, and I believe the plant still survives, though not so vigorous as when obtained, the present situation probably being unsuitable for it. Fortunately, there are many large specimens still in the Dandenongs, notwithstanding the spoilage of half a century."

AN ANT-BATTLE.

When crossing a cattle track in a paddock one morning, my attention was drawn to a dark mass along the way. It was formed by ants. A battle was raging between mound-ants, *Iridomyrmex detectus* and small black ants. The battle-ground, on a clear track, was about a chain from the large ants' nest.

The "meat" ants fought bravely, and so did the little black fellows. If one of the latter came near enough, a big ant caught him in its mandibles, and death followed! In numbers the mid-gets had the advantage, and nine or ten of them would seize a mound ant by the legs and antennæ. Many a mound ant was seen with all its legs missing from one side. When holding the legs of a foe, the blacks were safe, as the large ant could not turn its head to seize them, though striving to do so. But, clinging to the antennæ, the blacks were in danger of being drawn into the mandibles.

The small ants were very lively, running about in every direction, until they seized upon an enemy. I do not know whether there were any leaders in this great battle, which lasted for three days after I first became an eye-witness. The battle-ground was strewn with dead and dying; there was not one large ant left at the mound. A few days later, the *Iridomyrmex* citadel was occupied by the Liliputians, and all seemed to be going on well with them. It is strange that the mound ants should leave their stronghold to fight until none remained alive. I have seen two ant-battles, fought on the Wimmera, in the course of 50 years, and the smaller species was victorious on both occasions.—JAMES HILL (Murtoa, Vic.).